

# Review of the genus *Pseudovelgia* (Heteroptera, Veliidae) on the Philippines: Part II: Greater Luzon<sup>1</sup>

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**Abstract:** Nine new species of *Pseudovelgia* HÖBERLANDT are described: *P. polhemi* nov.sp., *P. cristata* nov.sp., and *P. curvata* nov.sp. from northern Luzon; *P. gapudi* nov.sp. from northern and southern Luzon; *P. simplex* nov.sp., *P. quezonica* nov.sp., *P. heissi* nov.sp., and *P. quadrifolia* nov.sp. from southern Luzon; *P. marinduquensis* nov.sp. from Marinduque. *Pseudovelgia reiseni* POLHEMUS 1976, is redescribed. A key to the males of *Pseudovelgia* species occurring in Greater Luzon is provided.

**Key words:** Greater Luzon, Heteroptera, key, new species, Philippines, *Pseudovelgia*, Veliidae.

## Introduction

A review of the Philippine species of *Pseudovelgia* is planned to be published in four parts corresponding to the biogeographical regions: part III: Greater Mindoro, Burias, Sibuyan, Romblon-Tablas, Greater Negros-Panay; part IV: Greater Mindanao, Camotes, Siquijor, Camiguin; new species from Greater Palawan have already been described (part I: SEHNAL 1999).

The biogeographical regions of the Philippines (Fig. 1) correspond to the limits of the late Pleistocene Islands (18.000 years ago), where the sea level was about 120 m lower than today (ZETTEL et al. 1999: fig. 152). Since then, no landbridge connecting the Philippines with Asia has existed. In the late middle Pleistocene (160.000 years ago), the sea level was 160-180 m lower than at present, and the ~145 m deep channel between Palawan and Borneo probably was dry (HEANEY 1985). A study of non-volant mammals (HEANEY 1986) shows that many species and genera of Greater Palawan are shared with Borneo. This region is therefore part of the Sunda zoogeographic province, whereas the other biogeographical regions belong to the Philippine faunal province.

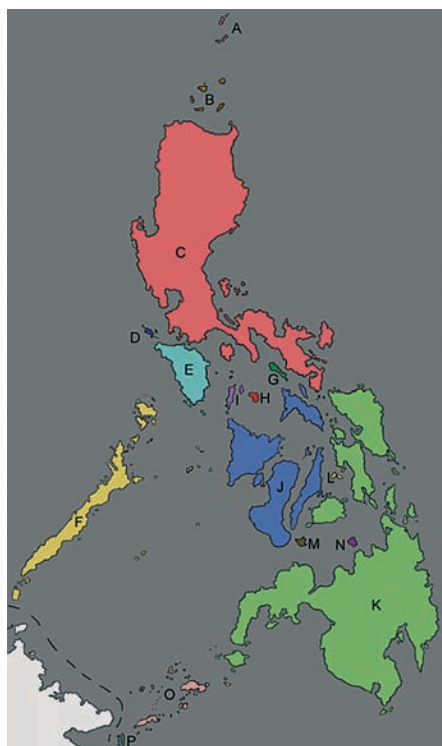
Luzon is the largest and oldest island of the Philippines. A group of small islands were connected by sediments filling the basins in between. It is thought to have existed since the late Eocene or early Oligocene (HEANEY 1986). The rate of endemism is rather high (HEANEY 1986).

## Material and Methods

The examined material is deposited in the following collections:

CHI . . . . .Collection Ernst Heiss,  
Innsbruck, Austria  
CNTN . . . . .Collection Nico Nieser,  
Tiel, The Netherlands  
CSW . . . . .Collection Franz Seyfert,  
Vienna, Austria  
CZW . . . . .Collection Herbert and Sally V.  
Zettel, Vienna, Austria  
JTPC . . . . .John T. Polhemus Collection,  
Englewood, Colorado, U.S.A.  
NHMW . . . . .Natural History Museum,  
Vienna, Austria  
OÖLM . . . . .Oberösterreichisches  
Landesmuseum, Linz, Austria  
UPLB . . . . .Museum of Natural History,  
University of the Philippines, Los  
Baños, Laguna, Philippines

<sup>1</sup>This paper is dedicated to Dr. Ernst Heiss, whom I appreciate for his knowledge and contribution to the taxonomy of Heteroptera, on the occasion of his 70<sup>th</sup> birthday.



**Fig. 1:** Biogeographical regions of the Philippines. (A) Batanes, (B) Babuyan, (C) Greater Luzon, (D) Lubang, (E) Greater Mindoro, (F) Greater Palawan, (G) Burias, (H) Sibuyan, (I) Romblon-Tablas, (J) Greater Negros-Panay, (K) Greater Mindanao, (L) Camotes, (M) Siquijor, (N) Camiguin, (O) Greater Sulu, (P) Sibutu.

USNM ..... United States National Museum, Washington, U.S.A.

Abbreviations: apt. = apterous, macr. = macropterous

Measurements were taken from at least three males and three females of each morph and each locality or of all specimens, if fewer than three were available. All measurements are given in mm. The relative lengths of antennal segments 1, 3, and 4 are related to the length of segment 2. The term "genitalia" is used functionally and thus including segment 8 of males.

*Pseudovelvia reiseni* POLHEMUS 1976 is re-described because the original description lacks many characters which turned out to be of diagnostic value.

### Key to males of *Pseudovelvia* from Greater Luzon

- 1 First metatarsal segment as long as or longer than second ..... 2
  - First metatarsal segment shorter than second ..... 6
- 2 First metatarsal segment with a tuft of very long hairs basally; metatarsus > 2/3 length of metatibia ..... 3
  - First and second metatarsal segment with a row of long hairs over entire length (Fig. 3); metatarsus about half as long as metatibia ..... *P. curvata* nov.sp.
- 3 Ventral depression of segment 8 with four oval or teardrop-shaped, hairless areas (Fig. 36) .....
  - P. quadrifolia* nov.sp.
  - Ventral depression of segment 8 with two oval or teardrop-shaped, hairless areas ..... 4
- 4 Ventral depression consisting of only two teardrop-shaped, hairless areas, bordered by a high ridge (Fig. 39) *P. marinduquensis* nov.sp.
  - Ventral surface with a large, more or less circular depression, bearing two teardrop-shaped, hairless areas ..... 5
- 5 Two transverse impressed areas in the middle of the ventral depression (Fig. 25) *P. gapudi* nov.sp.
  - Two teardrop-shaped areas at the caudal margin of the ventral depression (Fig. 16) *P. polhemi* nov.sp.

- 6 Segment 9 with a tuft or row of long hairs ..... 7
  - Segment 9 without a tuft or row of long hairs ..... *P. simplex* nov.sp.
- 7 Metatarsus with a tuft or row of long hairs ..... 8
  - Metatarsus without a tuft or row of long hairs (Fig. 10) ..... *P. cristata* nov.sp.
- 8 First metatarsal segment basally with a tuft of very long hairs (Fig. 4); metatarsus > 2/3 length of metatibia .....
  - P. reiseni* POLHEMUS
  - First metatarsal segment with a row of long hairs over entire length ..... 9
- 9 Segment 9 with a thin tuft of ~5 very long, curved hairs (Fig. 35) .....
  - P. heissi* nov.sp.
  - Segment 9 with a tuft of dense, long hairs on a low tubercle (Fig. 32) .....
    - P. quezonica* nov.sp.

### Descriptions

#### *Pseudovelvia reiseni* POLHEMUS 1976 (Figs 4, 13-15, 42, 48, 58)

*Pseudovelvia reiseni* POLHEMUS in POLHEMUS & REISEN 1976: 272-273.

Type locality: Luzon, Zambales Mountains.

Material examined: Paratypes: 1♂, 1♀ (apt.) [LUZON, R.P. \ 4 Feb. 1971 \ W.K. Reisen] [PACAF Jungle \ Survival School] [Paratype \ *Pseudovelvia reiseni* \ J.T.Polhemus] (JTPC).

Further material: 1♂ (apt.) [Zambales: Sta. Cruz \ A coje Mine Site \ BALISBIS CRK: 16 MAY \ 1977: V.P.GAPUD] (UPLB); 1♂, 1♀ (apt.), 1♀ (macr.) [PHILIPPINEN: Bataan \ Olongapo, Subic Base \ Riding Stable, 2.12. \ leg. H. Zettel 1993 (37e)] [*Pseudovelvia reiseni* POLHEMUS \ det. H. Zettel 1994] (NHMW); 1♂, 2♀♀ (apt.) [ZAMBALES: SBFR \ Boton/ 6-11 Dec/ 96 \ V Gapud / M Saulog] (UPLB); 8♂♂, 6♀♀ (apt.), 1♂, 1♀ (macr.) [Philippinen Luzon \ Zambales Subic Bay \ Aeta village 9.12.2000 \ leg. H Zettel (261)] [*Pseudovelvia reiseni* POLHEMUS \ det H Zettel 2001] (NHMW).

#### Redescription

Size. Body length 2.00-2.17 (apt. ♂♂), 2.38 (macr. ♂), 2.37-2.63 (apt. ♀♀), 2.65-2.80 (macr. ♀♀); length of tergites 1-7(8) to width of tergite 4 as 1:0.31-0.37 (apt. ♂♂), 1:0.28-0.32 (apt. ♀♀); maximum width across suture between metanotum and laterotergite 1: 0.85-0.93 (apt. ♂♂), across lat-

eroterigite 1: 1.00-1.07 (apt. ♀♀); width of pronotum 0.77-0.83 (apt. ♂♂), 1.08 (macr. ♂), 0.82-0.87 (apt. ♀♀), 1.12-1.22 (macr. ♀♀); width of head 0.55-0.63 (♂♂, ♀♀).

#### Apterous male

Colour. Head brown to blackish, with posterior margin of vertex slightly lighter; antenna light to dark brown. Pronotum light to dark brown, with transverse stripe near anterior margin light brown to yellow; black, irregularly distributed punctures or pores on pronotum, but missing on stripe. Metanotum blackish or brown with sutures between pronotum and metanotum, and between metanotum and laterotergite 1 black. Legs light brown, with base of femora yellow, apex of femora, base and apex of tibiae, and entire tarsi slightly darker. Tergites dark brown to blackish, tergite 7 caudally light brown to reddish-brown. Laterotergite 1 brown to blackish, laterotergites 2-7 medially dark brown, laterally lighter brown to reddish-brown. Ventral surface of thorax and abdomen blackish, stripe on lateral margins of sternites light brown to reddish-brown.

Pilosity. Entire body surface covered with short, recumbent, silvery hairs and long, erect hairs. Stout, silvery hairs forming stripes on vertex along margin of eyes, covering lateral area of tergite 1 and caudal margin of laterotergite 1, and forming medially patches on laterotergites 4-6, in some specimens (indistinct) patches at base of vertex and on tergites 6 and 7. Metatarsus with tuft of 5-7 very long, bristle-like hairs basally on segment 1, and with long, erect hairs on segments 1 and 2 (Fig. 4). Eyes without hairs except for two ocular setae.

Structural characters. Ventral lobe of head not produced caudad. Antenna 0.59-0.66 times as long as body, relative length of segments 1-4 as 1.1-1.3:1.0-1.3:1.4, segment 4 > segment 1. Pronotum 0.52-0.55 times as long as wide. Grasping comb on protibia 0.65-0.71 times as long as tibia. Metatarsus 0.71-0.78 times as long as metatibia, first segment 0.85-0.89 times as long as second. Tergite 1 with two shallow impressions. Second tergite 0.96-1.17 times as wide as head. Laterotergites 2-7 moderately raised.

Genitalia. Segment 8 short, ventral surface caudally with two transverse, teardrop-

shaped, hairless impressions, laterally and caudally bordered by a ridge and medially by two triangular areas, all furnished with hairs; ventral surface medially with larger, hairless depression, laterally bordered by a hairless ridge; caudo-dorsal margin of segment 8 with very long hairs (Figs 13-14). Proctiger and pygophore of segment 9 caudally with dense, short, erect hairs, pygophore with long, bristle-like hairs on caudo-lateral margin (Fig. 15).

#### Macropterous male

Colour as in apterous male, but pronotum dark brown to blackish, with transverse stripe near anterior margin and median line light brown to reddish-brown; legs darker brown, with base of femora light brown to yellow; forewing dark brown, with elongate white stripe at base.

Pilosity as in apterous male (except for bodyparts covered by wings); long, erect hairs on base of forewing (Fig. 42).

Structural characters and genitalia as in apterous male, but antenna 0.42 times as long as body; pronotum 1.08 times as long as wide; wings surpassing apex of abdomen.

#### Apterous female

Colour as in apterous male, but tergite 7 unicoloured; in some specimens tergite 1 with median part light brown and with black punctures; in some specimens caudal margin of sternite 7 light brown to reddish-brown.

Pilosity as in apterous male, but long, erect hairs more dense on latero-caudal margin of sternite 7 and almost missing on tergites 6 and 7; in some specimens additional patches of stout, silvery hairs on tergites 2 and 3, and medially on laterotergite 3; metatarsus without special pilosity.

Structural characters as in apterous male, but antenna 0.48-0.55 times as long as body; pronotum 0.46-0.53 times as long as wide; metatarsus 0.50-0.58 times as long as metatibia, first segment 0.53-0.61 times as long as second; laterotergites 2-7 more strongly raised, laterotergites 5-7 slightly converging but leaving tergites visible.

Genitalia. Proctiger with short, dense, erect hairs; gonocoxa 1 with some erect

hairs, and in some specimens with a small tuft of bristle-like hairs; structure as shown in Fig. 48.

#### Macropterous female

Colour and pilosity as in macropterous male, but tergite 7 unicoloured and long hairs lacking at base of metatarsal segment 1.

Structural characters and genitalia as in apterous female, but antenna 0.46-0.50 times as long as body, relative length of segments 1-4 as 1.2-1.3:1.1:0.1:1.4-1.6; pronotum 0.82-0.84 times as long as wide; laterotergites 2-7 moderately raised; wings ending at caudal margin of tergite 8, one specimen dealate.

Diagnosis. Length of tergites 1-7(8) to width of tergite 4 as 1:0.31-0.37 (apt. ♂♂), 1:0.28-0.32 (apt. ♀♀); maximum width in apt. ♂♂ across suture between metanotum and laterotergite 1, in apt. ♀♀ across laterotergite 1; ♂: first metatarsal segment shorter than second, with tuft of very long hairs at base; metatarsus > 2/3 length of metatibia; pygophore with bristle-like hairs on caudo-lateral margin; ♀: gonocoxa 1 visible; structure of male and female genitalia as shown in Figs 13-15, 48.

Comparative notes. The structure of male segment 8 of *P. reiseni*, *P. polhemi* nov.sp., and *P. gapudi* nov.sp. is very similar, but the males of *P. reiseni* can be separated from those of the two other species by the length of the first metatarsal segment, which is shorter than the second. *P. heissi* nov.sp. and *P. quezonica* nov.sp. share this character with *P. reiseni*, but they have long hairs over the entire length of this segment. The females of *P. reiseni*, *P. polhemi* nov.sp., and *P. gapudi* nov.sp. can hardly be distinguished: the abdomen is slightly broader in *P. reiseni* than in the other two species (compare length of tergites 1-8 to width of tergite 4). In *P. heissi* nov.sp. and *P. quezonica* nov.sp., gonocoxa 1 is not visible because it is retracted into the abdomen.

Discussion. NIESER (1995) reported several specimens of *P. reiseni* from Luzon and Mindanao. The three ♂♂ from Luzon, Laguna, Los Baños belong to *P. gapudi* nov.sp., and the two specimens (1♂, 1♀) from Luzon, Infanta to *P. simplex* nov.sp.. Figures 17-19 of NIESER (1995) show details of the male

of *P. simplex* nov.sp.. The specimens from Mindanao will be discussed in part III.

Distribution. Northern Luzon: Zambales, Bataan (Fig. 58).

#### *Pseudovelia polhemi* nov.sp. (Figs 11, 16-18, 43, 57, 58)

Type locality: Luzon, La Union, Bacnotan, Don Mariano Marcos Mem. State University, Casiaman Falls.

Holotype: ♂ (apt.) [Philippines: La Union\ Bacnotan, Don Mariano\ Marcos Mem. State Univ.\ Casiaman Falls, 24.10.2002, leg. H. Zettel (312)] (UPLB). Paratypes: 18♂♂, 25♀♀ (apt.) + 1♂, 1♀ (apt.) in alcohol, same data as holotype (NHMW, UPLB); 2♂, 1♀ (apt.), 1♂, 2♀♀ (macr.) [PHILIPPINES, Luzon\ Benguet Province\ km 219, Kennon Road\ 30 km S. of Baguio City\ VII-8-85 CL 1962 200m.\ J.T. & D.A. Polhemus] (JTPC, NHMW); 1♂ (macr.) [Mt. Data\ 4 Aug 81\ VPG] (UPLB); 1♀ (apt.) [PHILIPPINES, Luzon\ Benguet Province\ stream SW of Baguio City\ CL 1961 VII-7-85 1500m.\ J.T. & D.A. Polhemus] (JTPC); 1♀ (apt.) [Philippines: LZ, Mount. Pr.\ S Sagada, Bagnen, slopes of\ Mt. Polis, 1600 m, 26.2.1999, leg. F. Seyfert (15)] (CSW); 1♂, 1♀ (apt.) [Philippines: LZ, Benguet\ Baguio, 2 km below Camp\ John Hay, 18.2.1999\ leg. H. Zettel (181)] (CZW); 11♂♂, 3♀♀ (apt.) [Philippines: LZ, Mount. Pr.\ Sagada, Bokong Waterfalls\ 1400 m, 19.2.1999\ leg. H. Zettel (182)] (CZW, UPLB); 6♂♂, 2♀♀ (apt.) [Philippines: LZ, Mount. Pr.\ NE Sagada, Banga'an\ Bomod-ok Wf., 22.2.1999\ 1500 m, leg. H. Zettel (185)] (CZW, UPLB); 23♂♂, 23♀♀ (apt.) [Philippines: LZ, Mount. Pr.\ Sagada, Echo Valley, Under\ ground River, 23.-24.2.1999\ 1500 m, leg. H. Zettel (186)] (NHMW, UPLB, OÖLM); 4♂♂, 1♀ (apt.) [Philippines: LZ, Mount. Pr.\ S Sagada, Bagnen, slopes of\ Mt. Polis, 1550 m, 26.2.1999, leg. H. Zettel (189b)] (NHMW); 3♂♂ (apt.) [Philippines: La Union\ Bacnotan, Don Mariano\ Marcos Mem. State Univ.\ NARTDI Falls, 23.10.2002\ leg. H. Zettel (310)] (NHMW); 1♀ (apt.) [Philippines: La Union\ Bacnotan, Don Mariano\ Marcos Mem. State Univ.\ small stream, 24.10.2002\ leg. H. Zettel (311)] (NHMW).

Further material: 5 larvae [Philippines: LZ, Mount. Pr.\ NE Sagada, Banga'an\ Bomod-ok Wf., 22.2.1999\ 1500 m, leg. H. Zettel (185)] (CZW); 2 larvae [Philippines: LZ, Mount. Pr.\ Sagada, Echo Valley, Under\ ground River, 23.-24.2.1999\ 1500 m, leg. H. Zettel (186)] (NHMW); 1 larva [Philippines: La Union\ Bacnotan, Don Mariano\ Marcos Mem. State Univ.\ NARTDI Falls, 23.10.2002\ leg. H.

Zettel (310)] (NHMW); 4 larvae in alcohol, same data as holotype (NHMW).

#### Description

**Size.** Body length 2.17-2.45 (apt. ♂♂), 2.47-2.70 (macr. ♂♂), 2.48-2.77 (apt. ♀♀), 2.60 (macr. ♀♀); length of tergites 1-7(8) to width of tergite 4 as 1:0.25-0.31 (apt. ♂♂), 1:0.19-0.24 (apt. ♀♀); maximum width across suture between metanotum and laterotergite 1: 0.82-0.93 (apt. ♂♂), 0.95-1.05 (apt. ♀♀); width of pronotum 0.75-0.83 (apt. ♂♂), 1.05-1.18 (macr. ♂♂), 0.77-0.87 (apt. ♀♀), 1.07-1.15 (macr. ♀♀); width of head 0.55-0.65 (♂♂, ♀♀).

#### Apterous male

**Colour.** Head dark brown to dark or light reddish-brown and black; antenna dark reddish-brown. Pronotum dark brown to reddish-brown, with transverse stripe near anterior margin light reddish-brown; black, irregularly distributed punctures or pores on pronotum, but missing on stripe. Metanotum dark reddish-brown, sutures between pronotum and metanotum, and between metanotum and laterotergite 1 black. Legs light to dark brown, with base of femora yellow to light brown, base of tibiae and apex of femora, tibiae, and tarsi dark brown. Tergites dark brown or reddish-brown, tergite 7 caudally light reddish-brown; tergite 1 with black punctures or pores. Laterotergite 1 dark reddish-brown, laterotergites 2-7 medially dark brown, laterally or entirely light brown to reddish-brown. Ventral surface of thorax and abdomen black, stripe on lateral margins of sternites reddish-brown.

**Pilosity.** Entire body surface covered with short, recumbent, silvery hairs and long, erect hairs, obviously long on femora, tibiae, and tarsi. Stout, silvery hairs forming stripes on vertex along margin of eyes, covering lateral area of tergite 1 and caudal margin of laterotergite 1, forming patches on tergites 6 and 7, and medially on laterotergites 4 and 5, in some specimens also on laterotergites 3 and 6. Metatarsus with tuft of 5-7 very long, bristle-like hairs basally on segment 1, and with long, erect hairs on segments 1 and 2 (Fig. 11). Eyes without hairs except for two ocular setae.

**Structural characters.** Ventral lobe of head not produced caudad. Antenna 0.55-

0.64 times as long as body, relative length of segments 1-4 as 1.2-1.4:1:0.9-1.1:1.3-1.6, segment 4  $\geq$  segment 1. Pronotum 0.58-0.65 times as long as wide. Grasping comb on protibia 0.71-0.78 times as long as tibia. Metatarsus 0.68-0.82 times as long as metatibia, first segment 0.97-1.13 times as long as second. Second tergite 0.85-1.00 times as wide as head. Laterotergites 2-7 moderately raised.

**Genitalia.** Segments 8 and 9 of similar structure as in *P. reiseni*, but slightly larger; hairs on segment 8 and on caudo-lateral margin of pygophore slightly longer and denser (Figs 16-18).

#### Macropterous male

**Colour** as in apterous male, but pronotum dark brown, with transverse stripe near anterior margin and median line orange-brown; forewing brown, with elongate white stripe at base.

**Pilosity** as in apterous male (except for bodyparts covered by wings); long, erect hairs on base of forewing (Fig. 43).

**Structural characters and genitalia** as in apterous male, but antenna 0.50-0.52 times as long as body; pronotum 0.86-0.94 times as long as wide; laterotergites 2-7 almost not raised; wings surpassing apex of abdomen.

#### Apterous female

**Colour** as in apterous males, but tergite 7 unicoloured and tergite 8 in some specimens caudally lighter than remaining tergites; caudal margin of sternite 7 light brown to reddish-brown.

**Pilosity** as in apterous male, but long, erect hairs obviously long and dense on caudal margin of tergite 8 and of sternite 7 and missing on tergites 5 and 6, in some specimens also on tergite 4; additional patch of stout, silvery hairs on tergite 3; metatarsus without special pilosity.

**Structural characters** as in apterous male, but antenna 0.44-0.54 times as long as body; pronotum 0.51-0.60 times as long as wide; metatarsus 0.50-0.59 times as long as metatibia, first segment 0.60-0.70 times as long as second; laterotergites 2-7 more strongly raised.



Genitalia. Proctiger with short, dense, erect hairs; gonocoxa 1 with some erect hairs and with a small tuft of bristle-like hairs; structure as shown in Fig. 57.

#### Macropterous female

Colour and pilosity as in macropterous male, but metatarsus without special pilosity.

Structural characters and genitalia as in apterous female, but structure of antenna and laterotergites 2-7 as in macropterous male; pronotum 0.80-0.90 times as long as wide; wings ending at apex of genitalia, one specimen dealate.

Diagnosis. Length of tergites 1-7(8) to width of tergite 4 as 1:0.25-0.31 (apt. ♂), 1:0.19-0.24 (apt. ♀); maximum width in apt. specimens across suture between metanotum and laterotergite 1; ♂: first metatarsal segment as long as or longer than second, with tuft of very long hairs at base; metatarsus > 2/3 length of metatibia; pygophore with bristle-like hairs on caudo-lateral margin; ♀: gonocoxa 1 visible; structure of male and female genitalia as shown in Figs 16-18, 57.

Etymology. *Pseudovelgia polhemi* nov.sp. is dedicated to Dr. John T. Polhemus (Colorado Entomological Museum, Englewood, Colorado), whom I thank for the loan of material.

Comparative notes. *Pseudovelgia polhemi* nov.sp. appears closely related to *P. gapudi* nov.sp., *P. quadrifolia* nov.sp., and *P. marinduquensis* nov.sp. The males of these species can only be distinguished by the structure of segment 8, whereas the females cannot be reliably distinguished.

Distribution. Northern Luzon: Benguet, Mountain Province, La Union (Fig. 58).

#### *Pseudovelgia cristata* nov.sp. (Figs 10, 19-21, 50, 58)

Type locality: Luzon, Mountain Province, Mt. Data.

Holotype: ♂ (apt.) [Philippinen: LZ, Mountain Prov., Mt. Data, small creek close to Mount Data Hotel, 2300m, 25.2.1999, leg. H. Zettel (188)] (UPLB). Paratype: 1 ♀ (apt.) same data as holotype (NHMW).

#### Description

Size. Body length 1.93 (apt. ♂), 2.28 (apt. ♀); length of tergites 1-7(8) to width of tergite 4 as 1:0.39 (apt. ♂), 1:0.40 (apt. ♀); maximum width across abdominal segment 4: 0.88 (apt. ♂), 1.05 (apt. ♀); width of pronotum 0.70 (apt. ♂), 0.74 (apt. ♀); width of head 0.53 (apt. ♂), 0.55 (apt. ♀).

#### Apterous male

Colour. Head dark brown and black; antenna dark brown. Pronotum dark brown, with transverse stripe near anterior margin light brown; black, indistinct, irregularly distributed punctures on pronotum, but missing on stripe. Metanotum dark brown, sutures between metanotum and laterotergite 1 black. Legs dark brown, with base of femora light brown to yellow. Tergites dark brown. Laterotergite 1 entirely and laterotergites 2-7 medially dark brown, laterally slightly lighter. Ventral surface of thorax and abdomen black, stripe on lateral margins of sternites dark brown.

Pilosity. Entire body surface covered with short, recumbent, silvery hairs and long, erect hairs. Stout, silvery hairs forming stripes on vertex along margin of eyes, covering lateral areas of tergite 1, scattered on tergites 2, 3, and 5, and forming patches on tergites 6 and 7, and medially on laterotergites 3-6. Metatarsus without additional hairs (Fig. 10). Eyes without hairs except for two ocular setae.

Structural characters. Ventral lobe of head not produced caudad. Antenna 0.69 times as long as body, relative length of segments 1-4 as 1.3:1:1.2:1.4. Pronotum half as long as wide. Grasping comb on protibia 0.69 times as long as tibia. Metatarsus 0.53 times as long as metatibia, first segment 0.60 times as long as second. Second tergite 1.05 times as wide as head. Laterotergites 2-7 moderately raised.

Genitalia. Ventral surface of segment 8 caudally with cup-shaped depression, caudal and lateral margin of depression furnished with hairs; bottom of depression with median spine; caudo-dorsal and caudo-lateral margin of segment 8 with long hairs (Figs 19-20). Proctiger and pygophore caudally with dense, short, erect hairs; pygophore with long, bristle-like hairs on caudo-lateral

margin, and with two tufts of very long, curved hairs on baso-lateral and medio-lateral portions (Fig. 21).

Macropterous morph unknown.

Apterous female

Colour as in apterous male, but head and metanotum black; pronotum dark reddish-brown.

Pilosity as in apterous male, but additional patch of stout, silvery hairs on tergite 5.

Structural characters as in apterous male, but antenna 0.54 times as long as body, relative length of segments 1-4 as 1.4:1.1:1.1:1.4; pronotum 0.47 times as long as wide; metatarsus 0.49 times as long as metatibia, first segment 0.55 times as long as second; second tergite 1.18 times as wide as head.

Genitalia. Proctiger and gonocoxa 1 with short, erect hairs; structure as shown in Fig. 50.

Diagnosis. Length of tergites 1-7(8) to width of tergite 4 as 1:0.39-0.40 (apt. ♂, ♀); maximum width in apt. specimens across abdominal segment 4; ♂: first metatarsal segment 0.60 times as long as second, without special pilosity; metatarsus about half as long as metatibia; pygophore with long, bristle-like hairs on caudo-lateral margin and with tufts of very long hairs on baso-lateral and medio-lateral portions; ♀: gonocoxa 1 visible; structure of male and female genitalia as shown in Figs 19-21, 50.

Etymology. "cristata" (Latin, meaning "carrying a tuft") refers to the tufts of long, curved hairs on the pygophore.

Comparative notes. *Pseudovelgia cristata* nov.sp. appears related to *P. curvata* nov.sp. because of the structure of male segment 8, but they differ in the pilosity of segments 8 and 9. Similar tufts on the pygophore are also apparent in *P. takarai* KONTYŮ 1964, described from the Ryukyu islands, but many other characters are different from *P. cristata* nov.sp. (e.g., length of grasping comb on protibia, pilosity and length of first metatarsal segment, structure of segment 8). Males of *P. cristata* nov.sp. and *P. curvata* nov.sp. can easily be distinguished by the

pygophore, the metatibia, which is strongly curved in *P. curvata* nov.sp., and the first metatarsal segment, which is shorter and has no special pilosity in *P. cristata* nov.sp. Females of these two species can hardly be distinguished, although the abdomen is slightly broader in *P. cristata* nov.sp. (compare length of tergites 1-8 to width of tergite 4) and the colour of the tibiae and tarsi is light brown to yellow in *P. curvata* nov.sp. and dark brown in *P. cristata* nov.sp.

Distribution. Northern Luzon: Mountain Province (Fig. 58).

### ***Pseudovelgia curvata* nov.sp. (Figs 3, 22-24, 44, 51, 58)**

Type locality: Luzon, Mountain Province, Sagada, Banga'an, Bomod-ok Waterfalls.

Holotype: ♂ (apt.) [Philippinen: LZ, Mount Pr. \ NE Sagada, Banga'an \ Bomod-ok Wf., 22.2.1999 \ 1500 m, leg. H. Zettel (185)] (UP-LB). Paratypes: 2 ♀♀ (apt.), 1 ♀ (macr.) same data as holotype (NHMW).

#### **Description**

Size. Body length 2.08 (apt. ♂), 2.25-2.45 (apt. ♀♀), 2.45 (macr. ♀); length of tergites 1-7(8) to width of tergite 4 as 1:0.38 (apt. ♂), 1:0.35 (apt. ♀♀); maximum width across suture between metanotum and laterotergite 1: 0.90 (apt. ♂), across abdominal segment 4: 0.97-1.03 (apt. ♀♀); width of pronotum 0.78 (apt. ♂), 0.77-0.78 (apt. ♀♀), 1.13 (macr. ♀); width of head 0.55-0.58 (♂, ♀♀).

#### **Apterous male**

Colour. Head dark brown and black, with posterior margin of vertex slightly lighter; antenna dark brown. Pronotum dark brown, with short, transverse stripe near anterior margin lighter brown; black, irregularly distributed punctures and pores on pronotum, but missing on stripe. Metanotum dark brown. Legs dark brown, with base of femora yellow and tibiae light brown. Tergites dark brown. Laterotergite 1 entirely and laterotergites 2-7 medially dark brown, laterally lighter brown. Ventral surface of thorax and abdomen black, narrow stripe on lateral margins of sternites brown.

Pilosity. Entire body surface covered with short, recumbent, silvery hairs and long, erect hairs. Stout, silvery hairs forming indistinct stripes on vertex along margin of

eyes, covering lateral areas of tergite 1, forming small patches on tergite 6, and indistinctly medially on laterotergites 3-5. Metatarsal segments 1 and 2 with row of long, erect, bristle-like hairs (Fig. 3). Eyes without hairs except for two ocular setae.

Structural characters. Ventral lobe of head not produced caudad. Antenna 0.71 times as long as body, relative length of segments 1-4 as 1.3:1:1.3:1.3. Pronotum 0.55 times as long as wide. Grasping comb on protibia 0.76 times as long as tibia. Metatibia strongly curved; metatarsus 0.54 times as long as metatibia, first segment as long as second. Second tergite 1.05 times as wide as head. Laterotergites 2-7 moderately raised.

Genitalia. Ventral surface of segment 8 caudally with cup-shaped depression; margin of depression laterally, latero-caudally, and medio-caudally with at all 6 tufts or spines consisting of bristles; bottom of depression with median spine; caudo-dorsal and caudo-lateral margin of segment 8 with very long hairs (Figs 22-23). Proctiger and pygophore with dense, long and short, erect hairs (Fig. 24).

Macropterous male unknown.

Apterous female

Colour as in apterous male, but transverse stripe on pronotum longer, reaching lateral margin of pronotum; legs light brown, with base of femora yellow, base of tibiae and tarsi and apex of femora, tibiae, and tarsi dark brown; laterotergites blackish, only narrow stripe at lateral margin dark brown.

Pilosity as in apterous male, but additional patch of stout, silvery hairs on tergites 2 and 7, and in one specimen on laterotergite 2; metatarsus without special pilosity.

Structural characters as in apterous male, but antenna 0.56-0.57 times as long as body, relative length of segments 1-4 as 1.4:1:1.2:1.4-1.5; pronotum 0.50-0.52 times as long as wide; metatibia slightly curved; metatarsus 0.48-0.53 times as long as metatibia, first segment 0.48-0.58 times as long as second; second tergite 1.14-1.17 times as wide as head.

Genitalia. Proctiger and gonocoxa 1 with short, erect hairs; structure as shown in Fig. 51.

Macropterous female

Colour and pilosity as in apterous female (except for body parts covered by wings); forewing dark brown, with elongate, white stripe at base; long, erect hairs on base of forewing (Fig. 44).

Structural characters and genitalia as in apterous female, but antenna 0.54 times as long as body; pronotum 0.82 times as long as wide; wings surpassing apex of abdomen.

Diagnosis. Length of tergites 1-7(8) to width of tergite 4 as 1:0.38 (apt. ♂), 1:0.35 (apt. ♀♀); maximum width in apt. ♂ across suture between metanotum and laterotergite 1, in apt. ♀♀ across abdominal segment 4; ♂: first metatarsal segment about as long as second, both with row of long hairs over entire length; pygophore with long, bristle-like hairs on caudo-lateral margin; ♀: gonocoxa 1 visible; structure of male and female genitalia as shown in Figs 22-24, 51.

Etymology. "curvata" (Latin, meaning "curved") refers to the strongly curved metatibia of males.

Comparative notes see "*Pseudovelgia cristata* nov.sp."

Distribution. Northern Luzon: Mountain Province (Fig. 58).

### *Pseudovelgia gapudi* nov.sp. (Figs 7, 25-27, 45, 52, 58)

*Pseudovelgia reiseni* NIESER 1995: 83-85 (nec Polhemus, partim, species from Laguna, Los Baños, misidentification).

Type locality: Luzon, Laguna, Los Baños, Tampalit Falls.

Holotype: ♂ (apt.) [PHILIPPINEN: Laguna\ Los Banos, Bach von\ Tampalit Falls, 15.11.\ leg. H.Zettel 1993 (22b)] (UPLB). Paratypes: 1♂ (apt.) same data as holotype (CZW); 1♀ (apt.) [LUZON\ Mt. Makiling\ MUDSPRING: LO-\WER CRK: 10/6/76\ V.P. GAPUD] [Ve. 356] (UPLB); 1♂ (apt.) [LUZON\ Mt. Makiling\ MUDSPRING: LO-\WER CRK: 10/6/76\ V.P. GAPUD] [Ve. 357] (UPLB); 1♂ (apt.) [LUZON\ Mt. Makiling\ Molawin Crk.\ DECEMBER 1976\ A.A. BARROSO] [Ve. 358] (UPLB); 1♀ (apt.) [LUZON\ Mt. Makiling\ Molawin Crk.\ DECEMBER 1976\ A.A. BARROSO] [Ve. 359] (UPLB); 1♀ (apt.) [LUZON\ Mt. Makiling\ Molawin Crk.\ MUDSPRING: SANDY\ BANKS: 3/8/77\ A.A. BARROSO] (UPLB); 1♀ (apt.) [LUZON\ Mt. Makiling\ ARTIFICIAL



POND\ SOCIAL GARDEN\ 2 AUG. 1978\ M.B. ENDIAPE] [Hb 518] (UPLB); 1 ♀ (apt.) [LUZON\ Mt. Makiling\ FLAT ROCKS\ 15 AUG 1978\ L.S. SANCHEZ] [Hb 520] (UPLB); 1 ♂ (apt.) [LUZON\ Mt. Makiling\ Molawin Crk.\ MBG: 8/28/78\ V.P. GAPUD] [Hb 522] (UPLB); 1 ♂ (apt.) [LUZON\ Mt. Makiling\ Molawin Crk.\ MBG: UPCF\ 28 AUG. 1978\ L.S. SANCHEZ] [Hb 523] (UPLB); 1 ♂ (apt.) [LUZON\ Mt. Makiling\ Molawin Crk.\ MBG: UPCI\ 28 AUG. 1978\ L.S. SANCHEZ] [Hb 524] (UPLB); 1 ♀ (apt.) [LUZON\ Mt. Makiling\ DAMPALIT FALLS\ 26 SEPT. 1978\ L.S. SANCHEZ] [Hb 525] (UPLB); 1 ♀ (macr.) [LUZON\ Mt. Makiling\ UPPER DAMPALIT \ 26 SEPT. 1978\ L.S. SANCHEZ] [Hb 526] (UPLB); 1 ♂ (apt.) [Philippines, Luzon: Lagunas,\ Mt. Makiling, stream above\ Mad Springs, 700 m,\ 22.XI.1995, J.Kodada lgt.] (NHMW); 1 ♀ (apt.) [Philippines, Luzon: Lagunas,\ Mt. Banahaw above Kina-\ buhayan, 600-700 m, trail to Crystalino, 24.XI, 1995\ J.Kodada & B. Rigová lgt.] (NHMW); 1 ♂ (apt.) [PHILIPPINEN: Laguna Pr.\ Los Banos, Mt. Makiling\ Molawin Creek, Coll.For.\ 8.2.1996, leg. Zettel (72)] (CZW); 6 ♂♂, 4 ♀♀ (apt.) [PHILIPPINEN: Laguna Pr.\ Los Banos, Mt. Makiling\ Molawin Creek, Coll.For.\ 8.2.1996, leg. Zettel (75)] (CZW, UPLB); 6 ♂♂, 8 ♀♀ (apt.), 1 ♂ (macr.) [PHILIPPINEN: Luzon, Laguna\ Los Banos, Mt. Makiling\ Molawin Cr., Flat Stones, 31.\ 10. 1996, leg. H.Zettel (87)] (NHMW, UPLB); 17 ♂♂, 11 ♀♀ (apt.) [Philippinen: Luzon, Laguna\ Los Banos, Mt. Makiling\ Flat Stones, 10.2.1998\ leg. H. Zettel (132)] (NHMW, UPLB, OÖLM); 6 ♂♂, 2 ♀♀ (apt.) [Philippinen: Luzon, Laguna\ Los Banos, Mt. Makiling\ 31.3.1998\ leg. H. Zettel (166)] (CZW, UPLB); 1 ♂ (apt.) [Philippinen: LZ, Laguna\ Los Banos, Mt. Makiling\ Mud Spring, 23.-24.1.1999\ leg. H. Zettel (167)] (CZW); 7 ♂♂, 10 ♀♀ [Philippinen: LZ, Laguna\ Los Banos, Mt. Makiling\ Flat Rock, 14.2.1999\ leg. H. Zettel (175)] (NHMW, UPLB); 1 ♂ (apt.) [Philippinen: Nueva Viscaya\ Santa Fe, Barakbak, 620m\ Barakbak Riv., 7.11.2002\ leg. H. Zettel (326)] (NHMW); 9 ♂♂, 5 ♀♀ (apt.) [Philippinen: Nueva Viscaya\ Santa Fe, Malico, Inacio\ Inacio River, 1200m, 8.11.\ 2002, leg. H. Zettel (330)] (NHMW, UPLB); 1 ♂, 3 ♀♀ (apt.) [Philippinen: Nueva Viscaya\ Santa Fe, Malico, Dulipay\ River, 8.11.2002\ leg. H. Zettel (331)] (NHMW); 6 ♂♂, 7 ♀♀ (apt.) [Philippinen: Nueva Viscaya\ Santa Fe, Malico, small\ creek, 8.11.2002\ leg. H. Zettel (332)] (NHMW, UPLB).  
Further material: 1 ♀ (apt., bad condition) [PHILIPPINEN: Luzon\ Laguna, Mt. Makiling\ 13.-18.11.1992\ leg. H. Zettel (1)] (NHMW); 1 larva [PHILIPPINEN: Laguna Pr.\ Los Banos, Mt. Makiling\ Molawin Creek, Coll.For.\

8.2.1996, leg. Zettel (75)] (CZW); 7 larvas [PHILIPPINEN: Luzon, Laguna\ Los Banos, Mt. Makiling\ Molawin Cr., Flat Stones, 31.\ 10. 1996, leg. H.Zettel (87)] (NHMW); 1 larva [Philippinen: Luzon, Laguna\ Los Banos, Mt. Makiling\ Flat Stones, 10.2.1998\ leg. H. Zettel (132)] (NHMW); 5 larvas [Philippinen: LZ, Laguna\ Los Banos, Mt. Makiling\ Flat Rock, 14.2.1999\ leg. H. Zettel (175)] (NHMW).

### Description

Size. Body length 2.00-2.23 (apt. ♂♂), 2.40 (macr. ♂), 2.23-2.68 (apt. ♀♀), 2.40 (macr. ♀); length of tergites 1-7(8) to width of tergite 4 as 1:0.30-0.36 (apt. ♂♂), 1:0.23-0.33 (apt. ♀♀); maximum width across suture between metanotum and laterotergite 1: 0.82-0.93 (apt. ♂♂), 0.90-1.05 (apt. ♀♀); width of pronotum 0.74-0.83 (apt. ♂♂), 1.08 (macr. ♂), 0.75-0.87 (apt. ♀♀), 1.03 (macr. ♀); width of head 0.52-0.63 (♂♂, ♀♀).

### Apterous male

Colour. Head dark brown and black; antenna dark brown. Pronotum dark brown to dark reddish-brown, with transverse stripe near anterior margin light brown or orange-brown; black, irregularly distributed pores or punctures on pronotum, but missing on stripe. Metanotum dark (reddish-) brown to black, suture between metanotum and laterotergite 1 black. Legs light brown to reddish-brown, with base of femora yellow, apex of femora and tibiae, base of tibiae, and entire tarsi darker brown. Tergites dark brown to black, tergite 7 caudally dark reddish-brown. Laterotergite 1 entirely and laterotergites 2-7 laterally reddish-brown, medially dark brown to black. Ventral surface of thorax and abdomen black, stripe on lateral margins of sternites reddish-brown.

Pilosity. Entire body surface covered with short, recumbent to suberect, silvery hairs and long, erect hairs, obviously long and dense on metatibia, in some specimens also on mesotibia. Stout, silvery hairs forming stripes on vertex along margin of eyes, small patch at base of vertex (in some specimens very indistinct or missing), covering lateral area of tergite 1 and caudal margin of laterotergite 1, and forming patch medially on laterotergites 3-5, in some specimens short, stout, silvery hairs scattered on tergite

7. Metatarsus with tuft of 5-7 very long, bristle-like hairs basally on segment 1, and with long, erect hairs on segments 1 and 2 (Fig. 7). Eyes without hairs except for two ocular setae.

Structural characters. Ventral lobe of head not produced caudad. Antenna 0.56-0.64 times as long as body, relative length of segments 1-4 as 1.2-1.4:1:0.8-1.1:1.3-1.5, segment 4  $\geq$  segment 1. Pronotum 0.52-0.63 times as long as wide. Grasping comb on protibia 0.69-0.76 times as long as tibia. Metatarsus 0.76-0.88 times as long as tibia and segment 1 of tarsus 0.97-1.17 times as long as segment 2. Second tergite 0.91-1.13 times as wide as head. Laterotergites 2-7 moderately raised.

Genitalia. Segment 8 slightly larger than in *P. reiseni*; ventral surface with two transverse, slender impressions with parallel sides (not teardrop-shaped), caudally and medially bordered by hairy areas, and only laterally by a slender ridge; caudo-dorsal margin of segment 8 with very long hairs (Figs 25-26). Proctiger and pygophore caudally with dense, short, erect hairs; pygophore with long, bristle-like hairs on caudo-lateral margin (Fig. 27).

#### Macropterous male

Colour as in apterous male, but pronotum dark brown, with transverse stripe and median line light brown; forewing dark brown, with elongate white stripe basally.

Pilosity as in apterous males (except for bodyparts covered by wings); long, erect hairs on base of forewing (Fig. 45).

Structural characters and genitalia as in apterous male, but antenna 0.54 times as long as body; pronotum 0.86 times as long as wide, with rather high median ridge; forewing surpassing apex of abdomen.

#### Apterous female

Colour as in apterous male, but tibiae in some specimens darker brown; tergite 7 unicoloured.

Pilosity as in apterous male, but long, erect hairs missing on tergites 6, 7, and basally on tergite 8, in some specimens also on tergite 5; metatarsus without special pilosity.

Structural characters as in apterous male, but antenna 0.47-0.55 times as long as body; pronotum 0.49-0.58 times as long as wide; metatarsus 0.51-0.62 times as long as metatibia, first segment 0.57-0.75 times as long as second; laterotergites 2-7 more strongly raised.

Genitalia. Proctiger with short, dense, bristle-like hairs; gonocoxa 1 with some erect hairs and with a small tuft of bristle-like hairs; structure as shown in Fig. 52.

#### Macropterous female

Colour and pilosity as in macropterous male, but metatarsus without special pilosity.

Structural characters and genitalia as in apterous female, but antenna half as long as body; pronotum 0.87 times as long as wide; laterotergites 2-7 moderately raised; wings surpassing apex of abdomen.

Diagnosis. Length of tergites 1-7(8) to width of tergite 4 as 1:0.30-0.36 (apt. ♂♂), 1:0.23-0.33 (apt. ♀♀); maximum width in apt. specimens across suture between metanotum and laterotergite 1; ♂: first metatarsal segment about as long as second, both with row of long hairs over entire length; pygophore with long, bristle-like hairs on caudo-lateral margin; ♀: gonocoxa 1 visible; structure of male and female genitalia as shown in Figs 25-27, 52.

Etymology. *Pseudovelvia gapudi* nov.sp. is dedicated to Dr. Victor P. Gapud (UPLB), whom I thank for the loan of material.

Comparative notes see "*P. polhemi* nov.sp."

Distribution. Northern Luzon: Nueva Viscaya; southern Luzon: Laguna (Fig. 58).

### *Pseudovelvia simplex* nov.sp. (Figs 9, 28-29, 56, 58)

*Pseudovelvia reiseni* NIESER 1995: 83-85 (nec *Polhemus*, partim, specimens from Infanta, misidentification).

Type locality: Luzon, Quezon Province, Infanta. Holotype: ♂ (apt.) [PILIPINAS: \ Luzon Infanta \ 4. IV. N9335 \ leg: N. Nieser] [Agos river \ pool at mar- \ gin at mouth] (CNTN). Paratypes: 1 ♀ (apt.) same data as holotype (NHMW); 1 ♀ (apt.) [PILIPINAS: \ Luzon Banu- \ gao, 4. IV. '93 \ leg: N. Nieser] [N9336 inlet \ of irriga- \ tion canal \ (Agos river)] (CNTN).

## Description

Size. Body length 1.93 (apt. ♂), 2.77-2.90 (apt. ♀♀); length of tergites 1-7(8) to width of tergite 4 as 1:0.32 (apt. ♂), 1:0.27-0.29 (apt. ♀♀); maximum width across suture between metanotum and laterotergite 1: 0.75 (apt. ♂), across laterotergite 1: 1.02-1.03 (apt. ♀♀); width of pronotum 0.68 (apt. ♂), 0.80-0.83 (apt. ♀♀); width of head 0.48 (apt. ♂), 0.60 (apt. ♀♀).

## Apterous male

Colour. Head dark brown to blackish; antenna brown. Pronotum brown, with transverse stripe near anterior margin slightly lighter; black, irregularly distributed punctures on pronotum, but missing on stripe. Metanotum brown, sutures between pronotum and metanotum, and between metanotum and laterotergite 1 blackish. Legs brown, with femora light brown to yellow. Tergites dark brown. Laterotergites brown. Ventral surface of thorax and abdomen black, stripe on lateral margins of sternites brown.

Pilosity. Entire body surface covered with short, recumbent, silvery hairs and long, erect hairs. Stout, silvery hairs forming stripes on vertex along margin of eyes, covering lateral areas of tergite 1, almost entire tergites 2-7, and laterotergites 2-7 medially. Metatarsus with row of about 5 long, bristle-like hairs over entire length of segment 1 (Fig. 9). Eyes without hairs except for two ocular setae.

Structural characters. Ventral lobe of head not produced caudad. Antenna 0.58 times as long as body, relative length of segments 1-4 as 1.4:1:1.0:1.6. Pronotum obviously narrow, 0.70 times as long as wide. Grasping comb on protibia 0.65 times as long as tibia. Metatibia slightly curved; metatarsus 0.57 times as long as metatibia, first segment 0.55 times as long as second. Tergite 1 medially flattened. Second tergite 0.89 times as wide as head. Laterotergites 2-7 moderately raised.

Genitalia. Ventral surface of segment 8 with two very shallow, small, elongate depressions (Figs 28-29). Proctiger and pygophore caudally with short, suberect hairs.

Macropterous morph unknown.

## Apterous female

Colour as in apterous male, but caudal margin of vertex reddish-brown; pronotum with medial area, caudal and caudo-lateral margin lighter brown; tergites entirely and laterotergites 2-7 medially dark brown, laterally lighter brown.

Pilosity as in apterous male, but long erect hairs obviously long on metatibia; stout, silvery hairs on tergites 4-6 only on caudal margin or missing; metatarsus without special pilosity.

Structural characters. Ventral lobe of head as in apterous male. Antenna 0.47-0.48 times as long as body, relative length of segments 1-4 as 1.1-1.3:1:1.0:1.4. Pronotum obviously narrow, 0.67-0.69 times as long as wide. Metatibia not curved; metatarsus 0.48-0.53 times as long as metatibia, first segment 0.58-0.60 times as long as second. Tergite 1 medially flattened. Second tergite 1.04-1.08 times as wide as head. Laterotergites 2-7 slightly or not raised.

Genitalia. Proctiger and gonocoxa 1 with dense, erect hairs; structure as shown in Fig. 56.

Diagnosis. Length of tergites 1-7(8) to width of tergite 4 as 1:0.32 (apt. ♂), 1:0.27-0.29 (apt. ♀♀); maximum width in apt. ♂ across suture between metanotum and laterotergite 1, in apt. ♀♀ across laterotergite 1; ♂: first metatarsal segment 0.55 times as long as second, with row of about 5 long, bristle-like hairs over entire length; metatarsus 0.57 times as long as metatibia; proctiger and pygophore with short, suberect hairs; ♀: gonocoxa 1 visible; structure of male and female genitalia as shown in Figs 28-29, 56.

Etymology. "simplex" (Latin, meaning "simple") refers to the plain structure of the male genitalia.

Comparative notes. *Pseudovelgia simplex* nov.sp. does not exhibit close relationships to any described species. The structure of the male segment 8 is similar to that of *P. pusilla* HECHER 1997, described and reported from Vietnam and Thailand (HECHER 1997, 2005), however, they are not closely related to each other because in *P. pusilla* the ventral lobe of the head is produced caudad.

Distribution. Northern Luzon: Quezon (Fig. 58).

***Pseudovelgia quezonica* nov.sp.**  
(Figs 6, 30-32, 54, 58)

Type locality: Luzon, Quezon Province, Quezon National Park.

Holotype: ♂ (apt.) [PHILIPPINES, Luzon\ Quezon Province\ Quezon Nat. Park, ponds\ and waterfalls at picnic\ area VII-10-85 CL 1970\ J.T. & D.A.Polhemus\ \ *not* reiseni] (USNM). Paratypes: 1♂ (apt.) [PHILIPPINES, Luzon\ Quezon Province\ Quezon Nat. Park, Nalubog\ Creek CL 1971 VII-10-85\ J.T. & D.A.Polhemus] (JTPC); 1♀ (apt.) [Philippines: Luzon, Quezon\ Atimonan, Quezon NP\ Old Zigzag Rd., 24.-30.3.\ 1988, leg. Zettel (165)] (CZW).

Description

Size. Body length 2.02-2.08 (apt. ♂♂), 2.58 (apt. ♀); length of tergites 1-7(8) to width of tergite 4 as 1:0.26 (apt. ♂♂), 1:0.16 (apt. ♀); maximum width across suture between metanotum and laterotergite 1: 0.80 (apt. ♂♂), 0.93 (apt. ♀); width of pronotum 0.75 (apt. ♂♂), 0.78 (apt. ♀); width of head 0.52-0.54 (apt. ♂♂), 0.58 (apt. ♀).

Apterous male

Colour. Head light brown to reddish-brown; antenna darker brown. Pronotum brown, with transverse stripe near anterior margin light brown; black, irregularly distributed punctures on pronotum, but missing on stripe. Metanotum dark brown to reddish-brown, sutures between metanotum and laterotergite 1 black. Legs dark brown, with base of femora lighter. Tergites black, tergite 7 caudally dark brown. Laterotergite 1 entirely and laterotergites 2-7 medially dark brown, laterally slightly lighter. Ventral surface of thorax and abdomen black, stripe on lateral margins of sternites brown.

Pilosity. Entire body surface covered with short, recumbent to suberect, silvery hairs and long, erect hairs, obviously long on meso- and metatibiae. Stout, silvery hairs forming stripes on vertex along margin of eyes, covering lateral area of tergite 1 and caudal margin of laterotergite 1, and forming indistinct patch on tergite 6. Metatarsal segments 1 and 2 with rows of long, bristle-like hairs over entire length (Fig. 6). Eyes without hairs except for two ocular setae.

Structural characters. Ventral lobe of head not produced caudad. Antenna 0.56-0.58 times as long as body, relative length of segments 1-4 as 1.0-1.1:1:1.1-1.2:1.7. Pronotum 0.60 times as long as wide. Grasping comb on protibia 0.76-0.77 times as long as tibia. Metatarsus 0.58-0.60 times as long as metatibia, first segment 0.86-0.91 times as long as second. Tergite 1 medially flattened. Second tergite 0.86-0.88 times as wide as head. Laterotergites 2-7 strongly raised.

Genitalia. Ventral depression of segment 8 with two oblique, upright, ear-like lobes furnished with hairs and marking off two elliptical areas at caudal margin of depression; caudo-dorsal margin of segment 8 with very long hairs (Figs 30-31). Proctiger and pygophore caudally with dense, short, erect hairs, pygophore with tubercles on caudo-lateral margins carrying a tuft of long, bristle-like hairs (Fig. 32).

Macropterous morph unknown.

Apterous female

Colour as in apterous male, but legs light brown, with base of femora yellow and apex of femora and tibiae, and entire tarsi dark brown; tergites dark brown to dark reddish-brown; laterotergites 2-7 lighter brown; caudal margin of sternite 7 brown.

Pilosity as in apterous male, but long, erect hairs obviously dense on laterotergites 4-7 and on lateral margin of sternites 4-7; additional patch of stout, silvery hairs on tergite 3, very indistinct on tergite 2, but missing on tergite 6; metatarsus without special pilosity.

Structural characters as in apterous male, but antenna 0.53 times as long as body; pronotum 0.55 times as long as wide; metatarsus 0.49 times as long as metatibia, first segment 0.56 times as long as second; laterotergites 2-7 very strongly raised and converging, but not touching.

Genitalia. Proctiger with dense, erect hairs, gonocoxa 1 retracted into abdomen; genital structure very low in profile (Fig. 54).

Diagnosis. Length of tergites 1-7(8) to width of tergite 4 as 1:0.26 (apt. ♂♂), 1:0.16 (apt. ♀); maximum width in apt. specimens

across suture between metanotum and laterotergite 1; ♂: first metatarsal segment 0.86-0.91 times as long as second, with row of long hairs over entire length; metatarsus 0.58-0.60 times as long as metatibia; pygophore with tubercles on caudo-lateral margins carrying a tuft of long, bristle-like hairs; ♀: gonocoxa 1 not visible; structure of male and female genitalia as shown in Figs 30-32, 54.

Etymology. “quezonica” refers to the type locality, the Quezon National Park.

Comparative notes. *Pseudovelia quezonica* nov.sp. does not exhibit close relationships to any described species. The structure of male segment 8 can be identified very easily. Tufts of hairs on male segment 9 are also apparent in *P. heissi* nov.sp., but are longer and curved. Gonocoxa 1 is not visible in *P. quezonica* nov.sp. and *P. heissi* nov.sp., but the females can be distinguished by the length of the antennal segments (first  $\leq$  third and 1.0-1.2 times as long as second in *P. quezonica* nov.sp., first  $>$  third and 1.3-1.5 times as long as second in *P. heissi* nov.sp.).

Distribution. Southern Luzon: Quezon (Fig. 58).

***Pseudovelia heissi* nov.sp.**  
(Figs 2, 12, 33-35, 46, 49, 58)

Type locality: Luzon, Albay Province, 40 km north of Legaspi, Malilipot, Busai Falls.

Holotype: ♂ (apt.) [Philippines: Luzon, Albay\ 40 km N Legaspi, 1 km W\ Malilipot, Busai Falls\ 23.2.1998, leg. Zettel (143)] (UPLB). Paratypes: 8♂♂, 6♀♀ (apt.), 7♂♂, 2♀♀ (macr.) same data as holotype (NHMW, UPLB, CHI) + 13♂♂, 3♀♀ (apt.) same data, in alcohol (UPLB); 4♂♂, 1♀ (apt.) [Philippines: Camarines Sur\ 20 km E Naga, E Carolina\ slopes of Mt. Isarog\ 4.3.1999, leg. Seyfert (19)] (CSW); 2♂♂ (apt.) [Philippines: Camarines Sur\ 20 km E Naga, 5 km E Carolina\ Mt. Isarog, Malabsay Falls\ 19.2.1998, leg. Zettel (141)] (NHMW); 12♂♂, 9♀♀ (apt.), 1♂, 2♀♀ (macr.) [Philippines: Camarines Sur\ 20 km E Naga, 3 km E Carolina\ Mainit Spring (Hydro)\ 20.2.1998, leg. Zettel (142)] (NHMW, UPLB, OÖLM) + 1♂, 2♀♀ (apt.) same data, in alcohol (UPLB); 3♂♂, 4♀♀ (apt.) [Philippines: Sorsogon\ NE Irosin, N San Roque\ Lake Bulusan, 630 m\ 26.2.1998, leg. Zettel (146)] (NHMW) + 1♂, 1♀ (apt.) same data, in alcohol (UPLB); 5♂♂, 4♀♀ (apt.) [Philippines: Sorsogon\ San Roque, Palok Tok\

Falls, 26.2.1998, leg. H. Zettel (147)] (NHMW, UPLB); 1♂, 6♀♀ (apt.) [Philippines: Camarines Sur\ Lake Buhi area, Twin Falls\ nr. Itbog, 22.3.1998\ leg. H. Zettel (164)] (CZW, UPLB); 2♂♂ (apt.) [Philippines: Camarines Sur\ 20 km E Naga, 5 km E Carolina\ Mt. Isarog, nr. Malabsay Falls\ 4.3.1999, leg. Zettel (192)] (NHMW); 4♂♂, 1♀ (apt.) [Philippines: Camarines Sur\ 20 km E Naga, 3 km E Carolina\ Mainit Spring (“Hydro“)\ 4.3.1999, leg. Zettel (193)] (NHMW, UPLB); 13♂♂, 13♀♀ (apt.), 2♂♂, 1♀ (macr.) [Philippines: Catanduanes\ W Bato, Maribini Falls\ 6.3.1999\ leg. H. Zettel (194)] (NHMW, UPLB); 2♂♂, 1♀ (apt.) [Philippines: Catanduanes\ S of Summit, N Narsari\ 9.3.1999, small creek\ leg. H. Zettel (198)] (NHMW); 2♂♂ (apt.) [Philippines: Catanduanes\ W Virac, Sto. Domingo\ Pajo River area, 10.3.\ 1999, leg. Zettel (199)] (NHMW); 10♂♂, 7♀♀ (apt.) [Philippines: Catanduanes\ E San Andres\ 11.-12.3.1999\ leg. H. Zettel (200)] (NHMW, UPLB); 12♂♂, 2♀♀ (apt.), 1♀ (macr.) [Philippines: Catanduanes\ E San Andres, below Lu Yong\ Cave, 12.4.2000\ leg. H. Zettel (254)] (CZW, UPLB); 10♂♂, 3♀♀ (apt.) [Philippines: Luzon, Cam.\ Sur, Lagonoy, Buenavista, Parogcan, 10.2.2001\ leg. H. Zettel (267b)] (CZW, UPLB); 1♂, 3♀♀ (apt.) [Philippines: Luzon, Camarines Sur, Pili, Buncao, Caririga Creek, 1.2.2002\ leg. H. Zettel (301)] (CZW); 5♂♂, 4♀♀ (apt.) [Philippines: Luzon, Camarines Sur, Pili, Buncao\ Himaao Creek, 1.2.2002\ leg. H. Zettel (302)] (CZW, UPLB); 3♂♂ (apt.) [Philippines: Luzon, Cam.\ Sur, Lagonoy, 1 km W San\ Sebastian, Kinayangan Riv.\ 2.2.2002, leg. Zettel (303)] (CZW); 10♂♂, 15♀♀ (apt.), 1♂, 1♀ (macr.) [Philippines: Luzon, Albay\ 40 km N Legaspi, 1 km W\ Malilipot, Busai Falls\ 7.3.2003, leg. Zettel (346)] (CZW, UPLB). Further material: 5 larvae in alcohol [Philippines: Camarines Sur\ 20 km E Naga, 3 km E Carolina\ Mainit Spring (Hydro)\ 20.2.1998, leg. Zettel (142)] (NHMW); 4 larvae in alcohol [Philippines: Luzon, Albay\ 40 km N Legaspi, 1 km W\ Malilipot, Busai Falls\ 23.2.1998, leg. Zettel (143)] (NHMW); 5 larvae in alcohol [Philippines: Sorsogon\ NE Irosin, N San Roque\ Lake Bulusan, 630 m\ 26.2.1998, leg. Zettel (146)] (NHMW); 2 larvae [Philippines: Camarines Sur\ Lake Buhi area, Twin Falls\ nr. Itbog, 22.3.1998\ leg. H. Zettel (164)] (CZW); 1 larva [Philippines: Camarines Sur\ 20 km E Naga, 3 km E Carolina\ Mainit Spring (“Hydro“)\ 4.3.1999, leg. Zettel (193)] (NHMW); 1♀ (macr.), 3 larvae [Philippines: Luzon, Cam.\ Sur, Lagonoy, Buenavista, Parogcan, 10.2.2001\ leg. H. Zettel (267b)] (CZW); 1♀ (macr.) [Philippines: Luzon, Cam.\ Sur, Lagonoy, 1 km W San\ Sebastian, Kinayangan Riv.\ 2.2.2002, leg.





**Fig. 2:** *Pseudovelgia heissi* nov.sp., paratype, dealate ♂. Illustration by Matthias Buch.

Zettel (303)] (CZW); 1 larva [Philippinen: Luzon, Albay\ 40 km N Legaspi, 1 km\ W Malilipot, Busai Falls\ 7.3.2003, leg. Zettel (346)] (CZW).

#### Description

Size. Body length 1.97-2.20 (apt. ♂), 2.15-2.28 (macr. ♂), 2.32-2.60 (apt. ♀), 2.37-2.53 (macr. ♀); length of tergites 1-7(8) to width of tergite 4 as 1:0.28-0.35 (apt. ♂), 1:0.17-0.27 (apt. ♀); maximum width across suture between metanotum and laterotergite 1: 0.77-0.88 (apt. ♂), across laterotergite 1: 0.85-1.00 (apt. ♀); width of pronotum 0.72-0.83 (apt. ♂), 0.97-1.03 (macr. ♂), 0.75-0.85 (apt. ♀), 1.05-1.15 (macr. ♀); width of head 0.51-0.63 (♂, ♀).

#### Apterous male

Colour. Head light to dark brown or reddish-brown and black; antenna dark brown. Pronotum brown to dark brown, with transverse stripe near anterior margin in most specimens only slightly lighter; black, irregularly distributed punctures or pores on pronotum, but missing on stripe. Metanotum orange-brown to dark reddish-brown, sutures between pronotum and metanotum, and between metanotum and laterotergite 1 black. Legs light to dark brown, with base of femora yellow to light brown, base of tibiae, apex of femora and tibiae, and entire tarsi dark brown. Tergites dark brown to blackish, in one specimen tergites medially dark reddish-brown, tergite 7 caudally dark reddish-brown. Laterotergites reddish-brown, only medial margin dark brown to blackish. Ventral surface of thorax and abdomen black, stripe on lateral margins of sternites reddish-brown.

Pilosity. Entire body surface covered with short, recumbent, silvery hairs and long, erect hairs, obviously long on meso- and metatibiae. Stout, silvery hairs forming stripes on vertex along margin of eyes, covering lateral area of tergite 1 and caudal margin of laterotergite 1, forming patches on tergite 6 and medially on laterotergites 4 and 5, in some specimens also on tergite 3 and laterotergite 3, and scattered on tergite 7. Metatarsal segments 1 and 2 with rows of long, erect hairs (Fig. 12). Eyes without hairs except for two ocular setae.

Structural characters. Ventral lobe of head not produced caudad. Antenna 0.58-0.68 times as long as body, relative length of segments 1-4 as 1.3-1.5:1:1.0-1.3:1.5-1.8, segment 4 > segment 1 > segment 3. Pronotum 0.55-0.62 times as long as wide. Grasping comb on protibia 0.58-0.71 times as long as tibia. Metatarsus 0.53-0.61 times as long as metatibia, first segment 0.72-0.96 times as long as second. Second tergite 0.87-1.03 times as wide as head. Laterotergites 2-7 moderately to slightly raised.

Genitalia. Ventral depression of segment 8 shallow, with median furrow, forking basally, and with two upright, triangular lobes at caudo-lateral margin, furnished with hairs; caudo-dorsal margin of segment 8 with very long hairs (Figs 33-34). Proctiger and pygophore caudally with dense, short, erect hairs, pygophore with thin tuft of ~5 very long, curved hairs on caudo-lateral margin (Fig. 35).

#### Macropterous male (Fig. 2)

Colour as in apterous male; forewing dark brown, with elongate white stripe at base and posteriorly with areas between veins lighter brown.

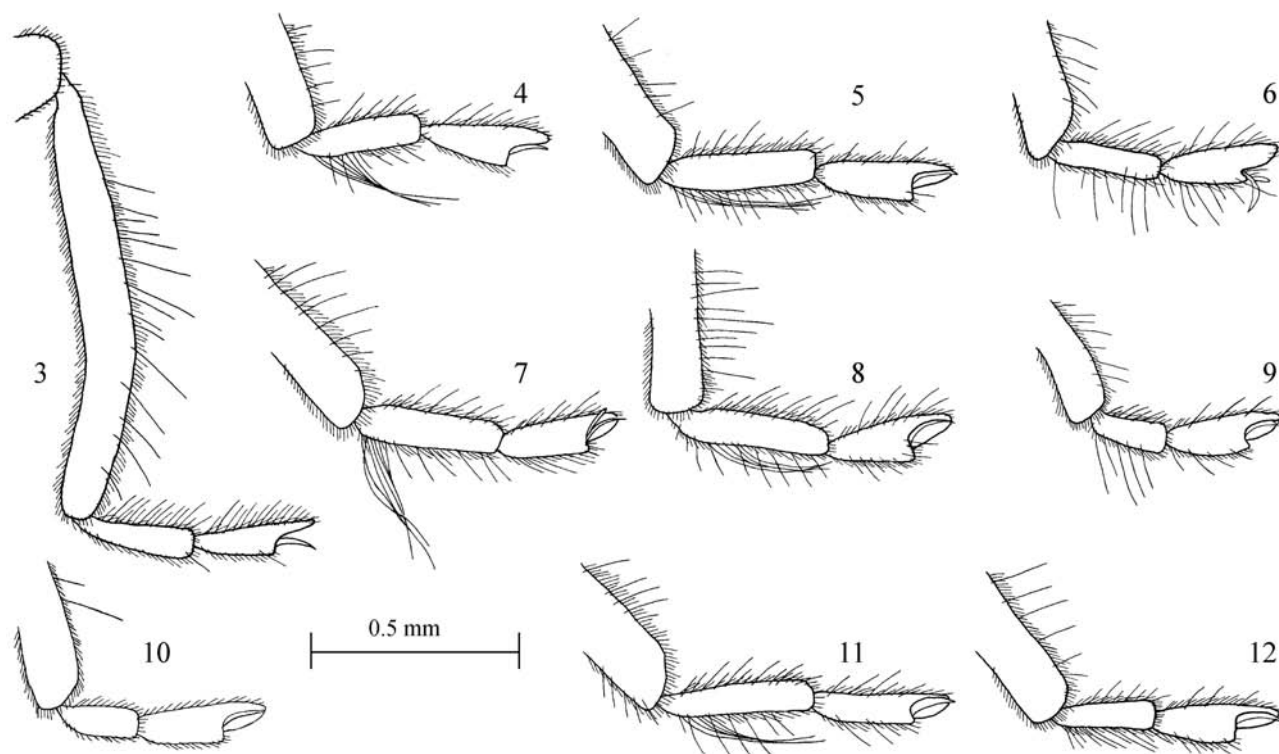
Pilosity as in apterous male (except for bodyparts covered by wings); long, erect hairs basally on forewing as shown in Fig. 46.

Structural characters and genitalia as in apterous male, but antenna 0.55-0.61 times as long as body; pronotum 0.83-0.87 times as long as wide; all specimens dealate.

#### Apterous female

Colour as in apterous male, but tergite 7 unicoloured; in some specimens caudal margin of sternite 7 reddish-brown; in some specimens transverse stripe on pronotum short and not extending over lateral portion.

Pilosity as in apterous male, but long, erect hairs obviously long, dense, and slightly curved on caudal margin of tergite 8, laterotergite 8, and of sternite 7, and missing on tergites 5-7; stout, silvery hairs forming additional, but indistinct patch on tergite 2 and laterotergite 6, and scattered on tergite 8, in some specimens also on tergite 4; metatarsus without special pilosity.



**Figs 3-12:** Metatarsus (and metatibia) of male. (3) *P. curvata* nov.sp. (4) *P. reiseni* nov.sp. (5) *P. quadrifolia* nov.sp. (6) *P. quezonica* nov.sp. (7) *P. gapudi* nov.sp. (8) *P. marinduquensis* nov.sp. (9) *P. simplex* nov.sp. (10) *P. cristata* nov.sp. (11) *P. polhemi* nov.sp. (12) *P. heissi* nov.sp. Pilosity partly omitted.

Structural characters as in apterous male, but antenna 0.51-0.60 times as long as body; pronotum 0.50-0.61 times as long as wide; metatarsus 0.49-0.55 times as long as metatibia, first segment 0.55-0.69 times as long as second; laterotergites 2-7 very strongly raised, caudally converging; tergite 8 deflexed caudally.

Genitalia. Proctiger with short, dense, erect hairs; gonocoxa 1 not visible, retracted into abdomen; structure as shown in Fig. 49.

#### Macropterous female

Colour and pilosity as in macropterous male, but metatarsus without special pilosity.

Structural characters and genitalia as in apterous female, structure of antenna and laterotergites 2-7 as in macropterous male, but pronotum 0.81-0.86 times as long as wide; all specimens dealate.

Diagnosis. Length of tergites 1-7(8) to width of tergite 4 as 1:0.28-0.35 (apt. ♂), 1:0.17-0.27 (apt. ♀♀); maximum width in apterous males across suture between metanotum and laterotergite 1, in apterous females across laterotergite 1; ♂: first metatarsal segment 0.72-0.96 times as long as second, with row of long hairs over entire

length of first and second segment; metatarsus 0.53-0.61 times as long as metatibia; pygophore of segment 9 with tufts of very long, curved hairs; ♀: gonocoxa 1 not visible; structure of male and female genitalia as shown in Figs 33-35, 49.

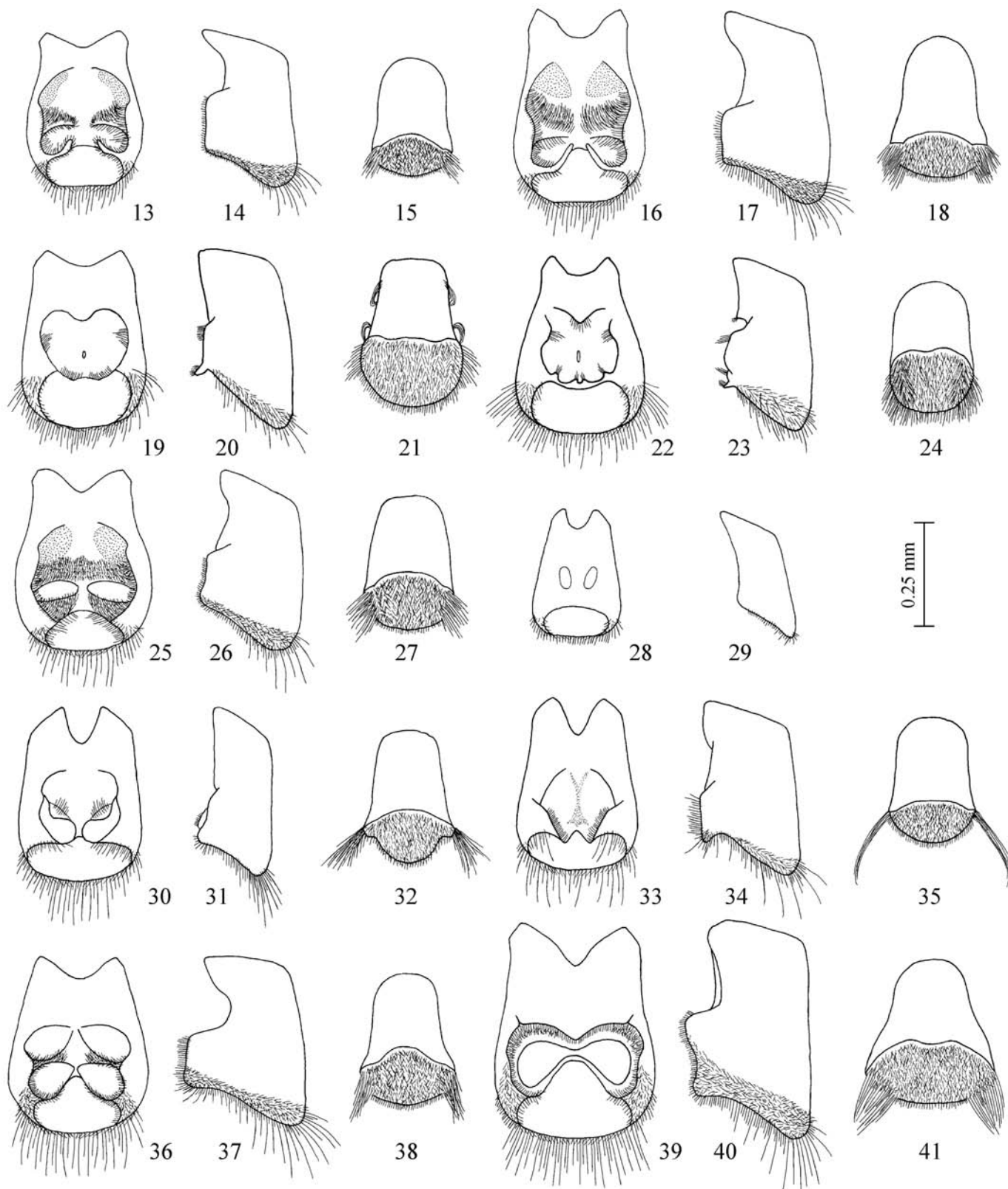
Etymology. *Pseudovelonia heissi* nov.sp. is dedicated to Dr. Ernst Heiss (Innsbruck), whom I congratulate on his 70<sup>th</sup> birthday.

Comparative notes. *Pseudovelonia heissi* nov.sp. does not exhibit close relationships to any described species. It shares some characters with *P. quezonica* nov.sp. (see "Comparative notes" of *P. quezonica* nov.sp.).

Discussion. In several sites on Camarines Sur and Catanduanes (CZW 194, 198, 267b, 301, 302, 303), *P. heissi* nov.sp. and *P. quadrifolia* nov.sp. live syntopically (Fig. 58). Males and females of these species can be distinguished easily.

One macropterous female from Lagonoy (CZW 267b), is excluded from the type series, because it has obviously curved metatibiae in addition to all typical characters. Further females are necessary to determine whether this is intraspecific variation or if this specimen is aberrant.





**Figs 13-41:** (13-15) *P. reiseni* (16-18) *P. polhemi* nov.sp. (19-21) *P. cristata* nov.sp. (22-24) *P. curvata* nov.sp. (25-27) *P. gapudi* nov.sp. (28-29) *P. simplex* nov.sp. (30-32) *P. quezonica* nov.sp. (33-35) *P. heissi* nov.sp. (36-38) *P. quadrifolia* nov.sp. (39-41) *P. marinduquensis* nov.sp. (13, 16, 19, 22, 25, 28, 30, 33, 36, 39) segment 8 of male, ventral. (14, 17, 20, 23, 26, 29, 31, 34, 37, 40) segment 8 of male, lateral. (15, 18, 21, 24, 27, 32, 35, 38, 41) segment 9 of male, ventral.

Distribution. Southern Luzon: Albay, Sorsogon, Camarines Sur, Catanduanes (Fig. 58).

***Pseudovelgia quadrifolia* nov.sp.**  
(Figs 5, 36-38, 47, 53, 58)

Type locality: Luzon, Camarines Sur Province, 20 km east of Naga, Malabsay Falls.

Holotype: ♂ (apt.) [Philippines: Camarines Sur \ 20 km E Naga, 5 km E Carolina \ Mt. Isarog, Malabsay Falls \ 19.2.1998, leg. Zettel (141)] (UPLB); Paratypes: 13♂♂, 12♀♀ (apt.) same data as holotype (NHMW, UPLB); 1♀ (apt.) [Philippines: Camarines Sur \ 20 km E Naga, E Carolina \ slopes of Mt. Isarog \ 4.3.1999, leg. Seyfert (19)] (CSW); 4♂♂, 2♀♀ (apt.), 1♂ (macr.) [Philippines: Catanduanes \ W Bato, Maribini Falls \ 6.3.1999 \ leg. H. Zettel (194)] (NHMW, UPLB); 2♂♂, 3♀♀ (apt.) [Philippines: Catanduanes \ N Bato, S San Miguel \ Balongbong Falls, 7.3. \ 1999, leg. H. Zettel (195)] (NHMW); 1♂ (macr.) [Philippines: Catanduanes \ S of Summit, N Narsari \ 9.3.1999, small creek \ leg. H. Zettel (198)] (NHMW); 1♂ (apt.) [Philippines: LZ, Camarines \ Sur, 20 km E Naga, 6 km E \ Carolina, Malabsay Falls \ 20.11.1999, leg. Zettel (208)] (CZW); 3♀♀ (apt.) [Philippines: Luzon, Cam. \ Sur, Lagonoy, Buenavista, \ Parogcan, 10.2.2001 \ leg. H. Zettel (267b)] (CZW); 1♂, 1♀ (apt.) [Philippines: Luzon, Cama- \ rines Sur, Pili, Buncao, \ Caririga Creek, 1.2.2002 \ leg. H. Zettel (301)] (CZW); 1♂ (macr.) [Philippines: Luzon, Cama- \ rines Sur, Pili, Buncao \ Himaao Creek, 1.2.2002 \ leg. H. Zettel (302)] (CZW); 1♀ (apt.), 1♂, 3♀♀ (macr.) [Philippines: Luzon, Cam. \ Sur, Lagonoy, 1 km W San \ Sebastian, Kinayangan Riv. \ 2.2.2002, leg. Zettel (303)] (CZW).

**Description**

Size. Body length 2.15-2.43 (apt. ♂♂), 2.37-2.48 (macr. ♂♂), 2.32-2.58 (apt. ♀♀), 2.47-2.53 (macr. ♀♀); length of tergites 1-7(8) to width of tergite 4 as 1:0.29-0.33 (apt. ♂♂), 1:0.18-0.25 (apt. ♀♀); maximum width across suture between metanotum and laterotergite 1: 0.90-0.93 (apt. ♂♂), 0.95-1.08 (apt. ♀♀); width of pronotum 0.82-0.86 (apt. ♂♂), 1.09-1.11 (macr. ♂♂), 0.80-0.88 (apt. ♀♀), 1.12-1.15 (macr. ♀♀); width of head 0.55-0.63 (♂♂, ♀♀).

**Apterous male**

Colour. Head light to dark brown and black; antenna brown to dark brown. Pronotum light to dark brown, with transverse stripe near anterior margin and median line

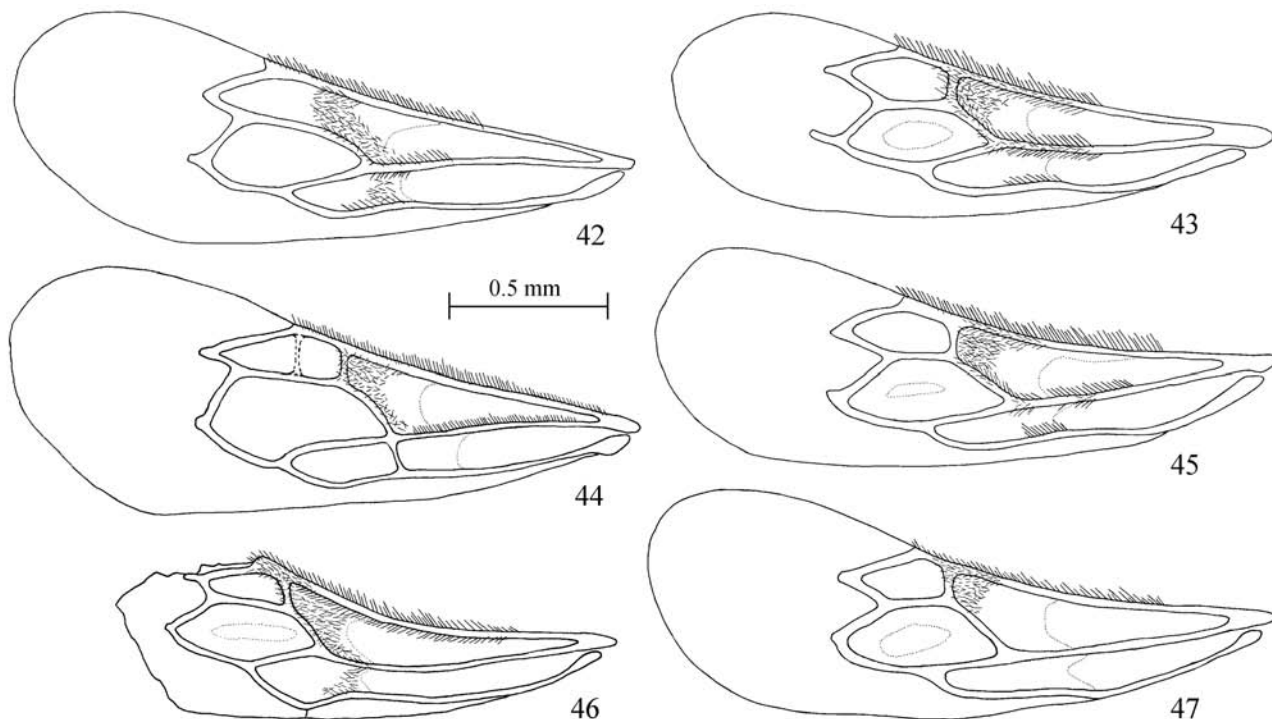
light brown to reddish-brown; black, irregularly distributed pores or punctures on pronotum, but missing on stripe. Metanotum black or brown to reddish-brown with sutures between pronotum and metanotum, and between metanotum and laterotergite 1 black. Legs brown to dark brown, with base of femora yellow. Tergites dark brown to black, tergite 7 caudally light brown to reddish-brown. Laterotergite 1 reddish-brown or dark brown, laterotergites 2-7 medially dark brown to black, laterally lighter brown to reddish-brown. Ventral surface of thorax and abdomen black, stripe on lateral margins of sternites and caudal margin of sternite 7 orange-brown.

Pilosity. Entire body surface covered with short, recumbent to suberect, silvery hairs and long, erect hairs, obviously long on metatibia, in some specimens also on mesotibia, and on latero-caudal margin of sternite 7. Stout, silvery hairs forming stripes on vertex along margin of eyes, small, indistinct patch at base of vertex, covering lateral area of tergite 1 and caudal margin of laterotergite 1, scattered on tergite 7, and forming patches medially on laterotergites 4 and 5, in some specimens also on laterotergite 3, in one specimen also on laterotergite 6 and on caudal margin of tergite 6. Metatarsus with tuft of 5-7 very long, bristle-like hairs basally on segment 1, and with long, erect hairs on segments 1 and 2 (Fig. 5). Eyes without hairs except for two ocular setae.

Structural characters. Ventral lobe of head not produced caudad. Antenna 0.54-0.65 times as long as body, relative length of segments 1-4 as 1.3-1.5:1.0-1.0:1.2-1.5. Pronotum 0.58-0.62 times as long as wide. Grasping comb on protibia 0.73-0.78 times as long as tibia. Metatarsus 0.74-0.82 times as long as metatibia, first segment 1.00-1.16 times as long as second. Second tergite 0.92-1.09 times as wide as head. Laterotergites 2-7 moderately to almost not raised.

Genitalia. Ventral surface of segment 8 with four teardrop-shaped, hairless impressions arranged similar to the leaf of a four-leafed clover, separated by a median furrow and a transverse ridge, becoming broader laterad; ridges and lateral margin of depression with dense, long hairs; caudo-dorsal





**Figs 42-47:** Forewing. (42) *P. reiseni* (43) *P. polhemi* nov.sp. (44) *P. curvata* nov.sp. (45) *P. gapudi* nov.sp. (46) *P. heissi* nov.sp. (47) *P. quadrifolia* nov.sp.

margin of segment 8 with very long hairs (Figs 36-37). Proctiger and pygophore caudally with dense, short, erect hairs, pygophore with long, bristle-like hairs on caudo-lateral margin (Fig. 38).

#### Macropterous male

Colour as in apterous male, but pronotum dark brown to blackish, with transverse stripe near anterior margin and median line light brown to reddish-brown; forewing dark brown, with elongate white stripe at base and whitish patch in discal cell.

Pilosity as in apterous male (except for bodyparts covered by wings); long, erect hairs basally on forewing (Fig. 47).

Structural characters and genitalia as in apterous male, but pronotum 0.89 - 0.90 times as long as wide; wings surpassing apex of abdomen.

#### Apterous female

Colour as in apterous male, but median line on pronotum lacking in some specimens; tergite 7 unicoloured; in some specimens tergite 1 with median part light brown and with black punctures.

Pilosity as in apterous male, but short, recumbent and long, erect hairs almost missing on tergites 5-7; in some specimens additional patch of stout, silvery hairs on

tergites 2 and 3; metatarsus without special pilosity.

Structural characters as in apterous male, but antenna 0.52-0.59 times as long as body; pronotum 0.52-0.61 times as long as wide; metatarsus 0.55-0.64 times as long as metatibia, first segment 0.58-0.68 times as long as second; laterotergites 2-7 very strongly raised, laterotergites 6 and 7 slightly converging but leaving tergites visible.

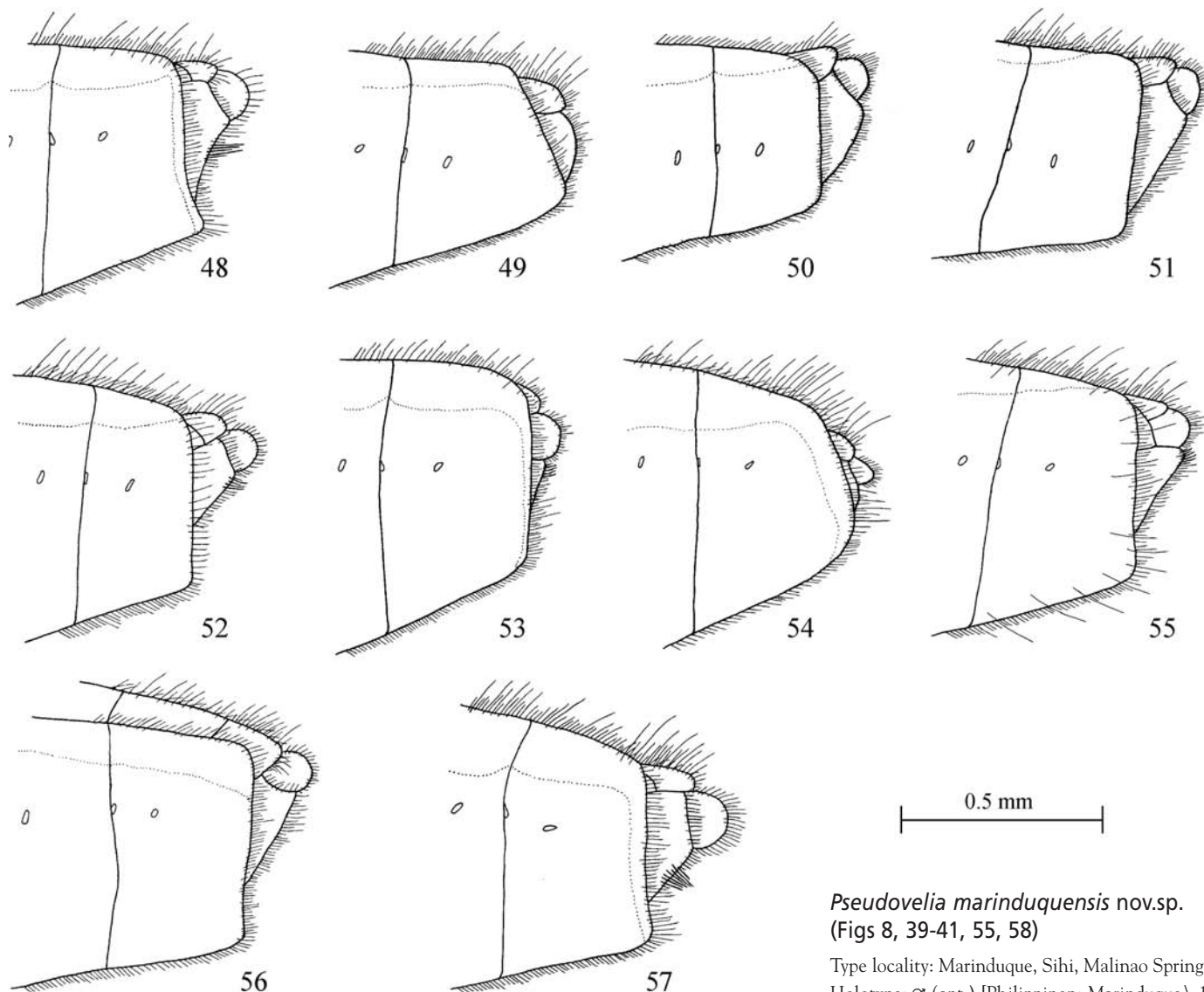
Genitalia. Caudal margin of tergite 8 slightly deflexed. Proctiger with short, dense, erect hairs; gonocoxa 1 with some erect hairs and with a small tuft of bristle-like hairs; structure as shown in Fig. 53.

#### Macropterous female

Colour and pilosity as in macropterous male, but metatarsal segments without special pilosity.

Structural characters and genitalia as in apterous female, but pronotum 0.87-0.88 times as long as wide; laterotergites 2-7 moderately to strongly raised; wings ending at apex of proctiger.

Diagnosis. Length of tergites 1-7(8) to width of tergite 4 as 1:0.29-0.33 (apt. ♂♂), 1:0.18-0.25 (apt. ♀♀); maximum width in apterous specimens across suture between metanotum and laterotergite 1; ♂: first



**Figs 48-57:** End of abdomen of female, lateral. (48) *P. reiseni* (49) *P. heissi* nov.sp. (50) *P. cristata* nov.sp. (51) *P. curvata* nov.sp. (52) *P. gapudi* nov.sp. (53) *P. quadrifolia* nov.sp. (54) *P. quezonica* nov.sp. (55) *P. marinduquensis* nov.sp. (56) *P. simplex* nov.sp. (57) *P. polhemi* nov.sp. Pilosity partly omitted.

metatarsal segment 1.00-1.16 times as long as second, with tuft of very long hairs at base; metatarsus 0.74-0.82 times as long as metatibia; pygophore with bristle-like hairs on caudo-lateral margin; ♀: gonocoxa 1 visible; structure of male and female genitalia as shown in Figs 36-38, 53.

Etymology. "quadrifolia" (latin, meaning "four leaves") refers to the four teardrop-shaped areas on the ventral surface of male segment 8, which are arranged like the leaves of a four-leaf clover.

Comparative notes see "*P. polhemi* nov.sp."

Distribution. Southern Luzon: Camarines Sur, Catanduanes (Fig. 58).

***Pseudovelia marinduquensis* nov.sp.  
(Figs 8, 39-41, 55, 58)**

Type locality: Marinduque, Sihi, Malinao Spring. Holotype: ♂ (apt.) [Philippinen: Marinduque\ 1 km N Sihi, Malinao\ Spring, 16.2.1998\ leg. H. Zettel (139)] (UPLB). Paratypes: 5 ♀♀ (apt.) same data as holotype (NHMW, UPLB). Further material: 1 larva, same data as holotype (NHMW).

**Description**

Size. Body length 2.20 (apt. ♂), 2.37-2.60 (apt. ♀♀); length of tergites 1-7(8) to width of tergite 4 as 1:0.35 (apt. ♂), 1:0.29-0.32 (apt. ♀♀); maximum width across suture between metanotum and laterotergite 1: 0.95 (apt. ♂), across laterotergite 1 or suture between metanotum and laterotergite 1: 0.95-1.10 (apt. ♀♀); width of pronotum 0.85 (apt. ♂), 0.80-0.85 (apt. ♀♀); width of head 0.57-0.63 (apt. ♂, ♀♀).

**Apterous male**

Colour. Head dark brown and black; antenna brown. Pronotum dark brown to

black, with transverse stripe near anterior margin lighter brown to orange-brown; black, irregularly distributed pores on pronotum, but missing on stripe. Metanotum black. Legs brown, with base of femora yellow. Tergites black, tergite 7 caudally dark reddish-brown. Laterotergite 1 entirely and laterotergites 2-7 medially black, laterally reddish-brown. Ventral surface of thorax and abdomen black, stripe on lateral margins of sternites reddish-brown.

**Pilosity.** Entire body surface covered with short, recumbent, silvery hairs and long, erect hairs, obviously long on meso- and metafemora, -tibiae, and -tarsi. Stout, silvery hairs forming stripes on vertex along margin of eyes, covering lateral area of tergite 1, scattered on tergite 7, and forming small patches on laterotergites 4 and 5. Metatarsus with tuft of 5-7 very long, bristle-like hairs basally on segment 1, and with long, erect hairs on segments 1 and 2 (Fig. 8). Eyes without hairs except for two ocular setae.

**Structural characters.** Ventral lobe of head not produced caudad. Antenna 0.64 times as long as body, relative length of segments 1-4 as 1.2:1:0.9:1.2. Pronotum 0.59 times as long as wide. Grasping comb on protibia 0.79 times as long as tibia. Metatarsus 0.73 times as long as metatibia, first segment 1.10 times as long as second. Second tergite as wide as head. Laterotergites 2-7 moderately raised.

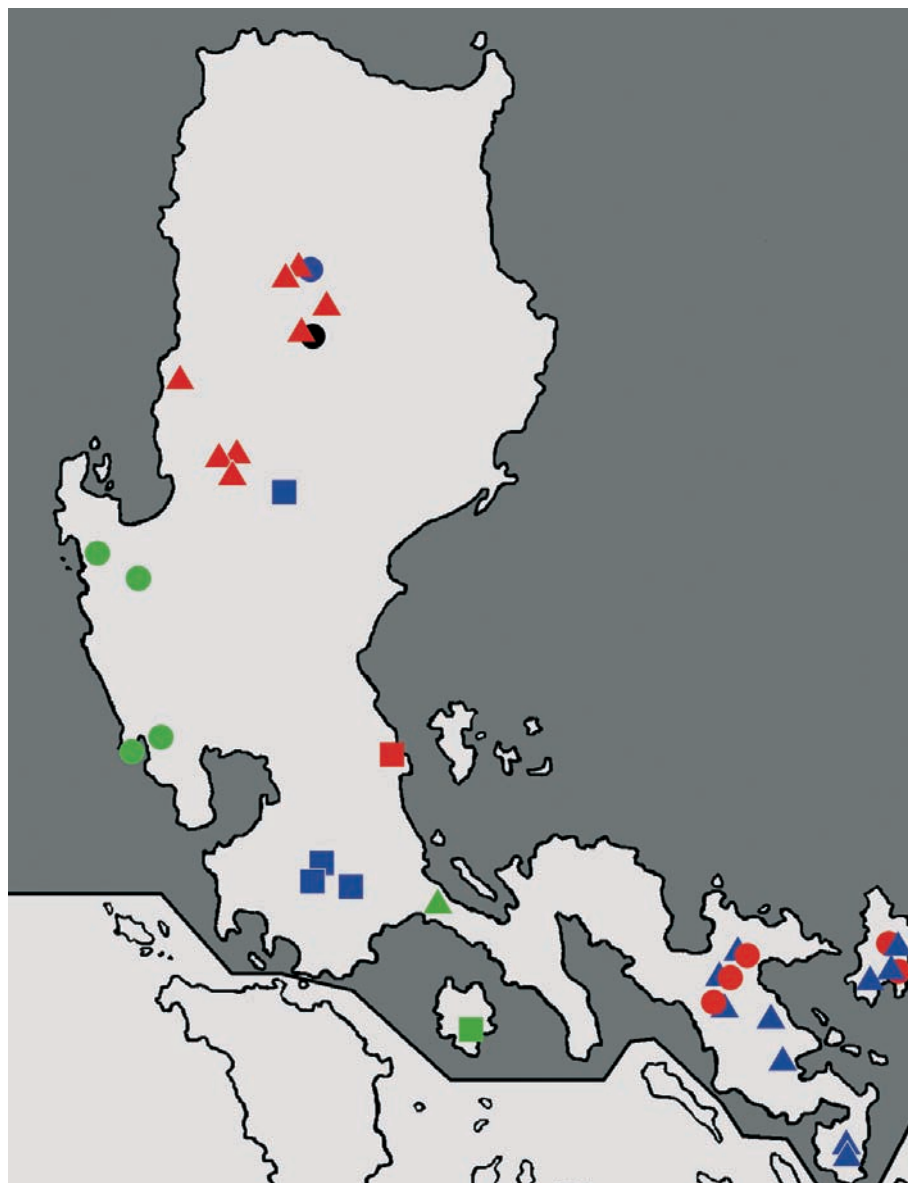
**Genitalia.** Ventral surface of segment 8 only with two transverse, teardrop-shaped depressions, bordered by a high ridge; caudo-dorsal margin of segment 8 with very long hairs (Figs 39-40). Proctiger and pygophore caudally with dense, short, erect hairs; pygophore with long, bristle-like hairs on caudo-lateral margin (Fig. 41).

Macropterous morph unknown.

Apterous female

Colour as in apterous male, but in some specimens posterior margin of vertex lighter brown; tergite 7 unicoloured; in some specimens caudal margin of sternite 7 reddish-brown.

**Pilosity** as in apterous male, but long, erect hairs missing on tergite 6 and base of tergite 7; stout, silvery hairs forming addi-



tional (in some specimens very small) patches on tergites 3, 6 and 7, and on laterotergites 3 and 6; metatarsus without special pilosity.

Structural characters as in apterous male, but antenna 0.53-0.55 times as long as body; pronotum 0.53 times as long as wide; metatarsus 0.53-0.56 times as long as metatibia, first segment 0.61-0.70 times as long as second; laterotergites 2-7 more strongly raised.

**Genitalia.** Proctiger with short, dense, erect hairs; gonocoxa 1 with some erect hairs and with a small tuft of bristle-like hairs; structure as shown in Fig. 55.

**Diagnosis.** Length of tergites 1-7(8) to width of tergite 4 as 1:0.35 (apt. ♂), 1:0.29-

**Fig. 58:** Distribution of *Pseudovelia* species on Greater Luzon. ● - *P. reiseni*, ▲ - *P. polhemi* nov.sp., ● - *P. cristata* nov.sp., ● - *P. curvata* nov.sp., ■ - *P. gapudi* nov.sp., ■ - *P. simplex* nov.sp., ▲ - *P. quezonica* nov.sp., ▲ - *P. heissi* nov.sp., ● - *P. quadri-foia* nov.sp., ■ - *P. marinduquensis* nov.sp.

0.32 (apt. ♀♀ ♀♀); maximum width in apt. ♂ across suture between metanotum and laterotergite 1, in apt. ♀♀ across laterotergite 1 or suture between metanotum and laterotergite 1; ♂: first metatarsal segment longer than second, with tuft of very long hairs at base; metatarsus about 3/4 length of metatibia; pygophore with bristle-like hairs on caudo-lateral margin; ♀: gonocoxa 1 visible; structure of male and female genitalia as shown in Figs 39-41, 55.

Etymology. “marinduquensis” refers to the type locality, the island Marinduque.

Comparative notes see “*P. polhemi* nov.sp.”

Distribution. Marinduque (Fig. 58).

## Additional notes

From Polillo Island, one apterous ♂, three macropterous ♂♂, and three apterous ♀♀ cannot be identified, because they are in very poor condition. They belong to at least two different species, one of which is possibly new.

1♂ (apt.), 2♂♂ (macr.) [QUEZON: Polillo\ 3. APRIL 1977\ H. SAN VALENTIN] [Ve 361] / [Ve 362] / [Ve 367], 1♂ (macr.) [QUEZON: Polillo\ 3. APRIL 1977\ A.A. BARROSO] [Ve 370], 3♀♀ (apt.) [QUEZON: Polillo\ 3. APRIL 1977\ A.A. BARROSO] [Ve 360] / [Ve 368] / [Ve 369].

Two apterous females from Lake Buhi area belong neither to *P. heissi* nov.sp. nor to *P. quadrifolia* nov.sp. They show some similarities with *P. marinduquensis* nov.sp. or represent a new species. 2♀♀ (apt.) [Philippinen: Camarines Sur\ Lake Buhi area, Twin Falls\ nr. Itbog, 22.3.1998\ leg. H. Zettel (164)] (CZW)

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## Zusammenfassung

Neun neue Arten von *Pseudovelia* HOBERLANDT werden beschrieben: *P. polhemi* nov.sp., *P. cristata* nov.sp. und *P. curvata* nov.sp. von Nord-Luzon; *P. gapudi* nov.sp. von Nord- und Süd-Luzon; *P. simplex* nov.sp., *P. quezonica* nov.sp., *P. heissi* nov.sp., und *P. quadrifolia* nov.sp. von Süd-Luzon; *P. marinduquensis* nov.sp. von Marinduque. *Pseudovelia reiseni* POLHEMUS 1976, wird wiederbeschrieben. Ein Bestimmungsschlüssel erlaubt die Identifizierung der Männchen jener *Pseudovelia* Arten, die in Greater Luzon vorkommen.

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